
Exploring the Therapeutic Effects of Chandra Nadi Pranayama on Components of Health-Related Fitness

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To cite this article:

Baljinder Singh Bal. Exploring the Therapeutic Effects of Chandra Nadi Pranayama on Components of Health-Related Fitness. *American Journal of Applied Psychology*. Vol. 4, No. 2, 2015, pp. 21-27. doi: 10.11648/j.ajap.20150402.11

Abstract: The present study was conducted with the objective to determine the short term practice of Chandra-Nadi pranayama on components of health-related fitness. For the purpose of present study 34 university level girls between the age group of 19-25 years were selected. The subjects were purposively assigned into two groups: Group-A: Experimental ($n_1=17$); Group-B: Control ($n_2=17$). The subjects from Group-A: Experimental were subjected to a 4-weeks Chandra Nadi pranayama. Student t test for paired samples was utilized to compare the means of the pre-test and the post-test. Based on the analysis of the results obtained, we conclude that the significant differences were found in Components of Health-Related Fitness (i.e., Cardiorespiratory Endurance, Flexibility) of University Level Girls. Insignificant between-group differences were noted in Muscular Strength, Muscular Endurance, % Body Fat, Fat Weight and Lean Body Weight of University Level Girls.

Keywords: Chandra Nadi Pranayama, Components of Health-Related Fitness

1. Introduction

Yogic techniques produce remarkable physiological changes and have sound scientific basis (Madanmohan et al. 1983 & Madanmohan et al. 1992 & Wallace et al. 1971). Yoga is a conventional long-established and time-tested art and therapeutic science that has positive contribution to make in maintenance of general wellbeing and happiness. It is now almost a proved fact based on various investigations that a prolonged continuous yogic practice and Chandra nadi Pranayam, relieve respiratory ailments like Bronchial Asthma, chronic Bronchitis, Bronchiectasis, and Ventilatory functions are much improved in them (Yadav & Das, 2001). The effect of different pranayamas on healthy (Subbalakshmi et al. 2005) and diseased people (Cooper et al. 2003, Dhungel et al. 2008) has been well studied and they are known to affect the cardiopulmonary activities and autonomic functions. When completed through the left nostril alone the practice is called "Chandra nadi Pranayam" which means a heat dissipating or cooling liberating practice. (Backon, 1988, Bhargava, 1988). Breath is a dynamic bridge between the body and mind (Bjilani, 2004). Breathing is not only an instinctive reflex to satisfy the need of the body for oxygen but it has been considered that consciously controlled breathing can be used as a technique for enhancing mental and physical powers

(Gharote, 2003). Pranayama produce different physiological responses in healthy young volunteers (Madanmohan et al, 2005, Shivraj et al, 2001). The practice of pranayama has been known to modulate cardiac autonomic status with an improvement in Cardio respiratory functions (Subalakshmi et al, 2005). Pranayama has immense therapeutic potential in a wide range of psychosomatic disorders, but there is currently lack of an adequate meta-analysis in relation to anuloma viloma pranayama to assess its efficacy with respect to components of health-related fitness and as a result the present study was conducted to find out therapeutic effects of Chandra nadi Pranayam on components of health-related fitness.

2. Material and Methods

2.1. Subjects

Thirty Four, university level girls between the age group of 19-25 years were selected. The subjects were purposively assigned into two groups: Group-A: Experimental ($n_1=17$); Group-B: Control ($n_2=17$).

Table 1. Distribution and Demographics of Subjects

Sample Size (N=34)			
Variables	Total (N=34)	Experimental group (n ₁ =17)	Control group (n ₂ =17)
Age	21.941±1.953	22±2	21.882±1.964
Body Height	5.317±1.402	5.3±1.414	5.335±1.411
Body Mass	55.823±2.430	55.411±2.425	56.235±2.437

2.2. Methodology

This study is designed as a retrospective cross-sectional study. The subjects from Group-A: Experimental were subjected to a 4-week training of Chandra-Nadi Pranayama. This lasted 4 weeks and consisted of daily sessions.

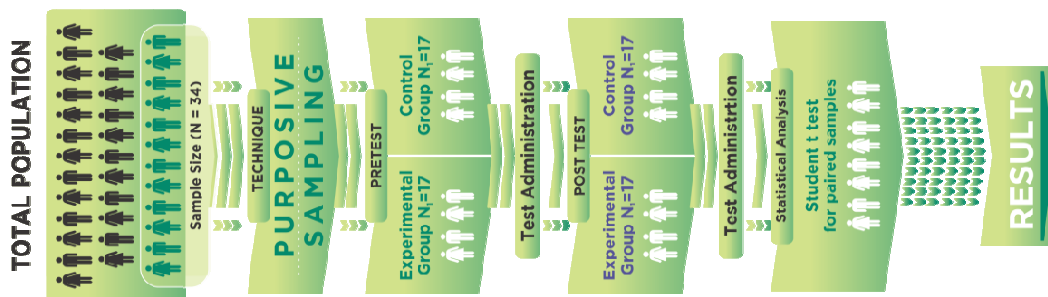


Figure 1. Study Design

Table 2. Experimental Treatment

4-Weeks Chandra-Nadi Pranayama Training			
Weeks	Schedule	Time	Duration
1 st Week	Preliminary Yogic Exercises	5 Minute	20 Minute
	Practice of Chandra Nadi Pranayama (9 Rounds X 1 Set)	10 Minute	
	Relaxation Posture	5 Minute	
2 nd Week	Preliminary Yogic Exercises	5 Minute	25 Minute
	Practice of Chandra Nadi Pranayama (9 Rounds X 2 Set)	15 Minute	
	Relaxation Posture	5 Minute	
3 rd Week	Preliminary Yogic Exercises	5 Minute	30 Minute
	Practice of Chandra Nadi Pranayama (9 Rounds X 3 Set)	20 Minute	
	Relaxation Posture	5 Minute	
4 th Week	Preliminary Yogic Exercises	5 Minute	35 Minute
	Practice of Chandra Nadi Pranayama (9 Rounds X 4 Set)	25 Minute	
	Relaxation Posture	5 Minute	

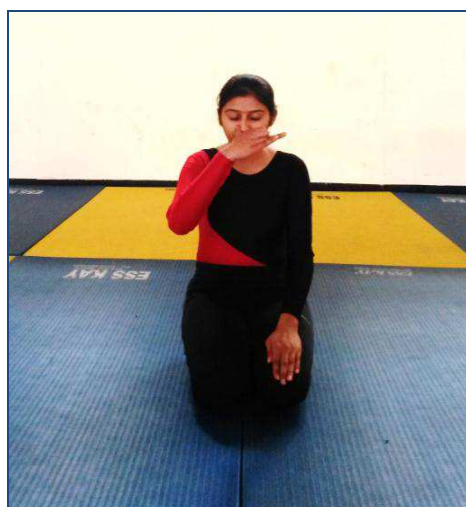
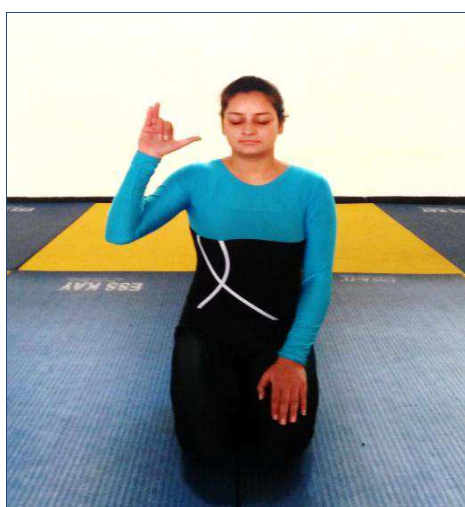




Figure 2. Subject Performing Chandra Nadi Pranayama

3. Statistical Analyses

Data is expressed as the mean \pm SD. Student t test for paired samples was utilized to compare the means of the pre-test and the post-test.

4. Results

4.1. Cardiorespiratory Endurance

The results of Components of Health-Related Fitness in group (Experimental) and group (Control) are shown in Table 3. The Mean and Standard Deviation (\pm SD) values of Cardiorespiratory Endurance of pre-test and post-test of

experimental group were 1862.06 ± 430.03 & 1867.94 ± 427.91 respectively. However, the Mean and Standard Deviation (\pm SD) values of Cardio respiratory Endurance of pre-test and post-test of control group were 1913.24 ± 383.17 & 1922 ± 378.14 . The t-value in case of experimental group was 3.7155^* and for control group it was 1.5466 .

Significant between-group differences were noted in Cardiorespiratory Endurance in the experimental group before (Pre) and after (Post) subjected to 4-weeks Chandra Nadi Pranayama Training Programme since, the calculated value of ($t=3.7155^*$) is greater than tabulated value of $t_{.05}(16) = 2.12$ for the selected degree of freedom and level of significance. However, no significant changes over that 4-weeks period were noted in the control group.

Table 3. Mean values (\pm SD) and Paired Sample t-test of Components of Health-Related Fitness (i.e., Cardiorespiratory Endurance, Muscular Strength, Muscular Endurance, Flexibility, % Body Fat, Fat Weight and Lean Body Weight) in Experimental and Control group ($n=17$ each) before (Pre) and after (Post) 4-weeks Chandra Nadi pranayama Training Programme (Experimental group only).

Parameters	Group	Pre-Test	Post-Test	t-value	p-value
Cardiorespiratory Endurance	Experimental	1862.06 ± 430.03	1867.94 ± 427.91	3.7155^*	0.0019
	Control	1913.24 ± 383.17	1922 ± 378.14	1.5466	0.1415
Muscular Strength	Experimental	36.29 ± 2.97	37.53 ± 3.04	1.9509	0.0688
	Control	36.18 ± 5.87	38.00 ± 11.91	0.7209	0.4814
Muscular Endurance	Experimental	35.65 ± 2.34	36.18 ± 3.13	1.4505	0.1662
	Control	27.82 ± 3.50	27.65 ± 3.10	0.5883	0.5645
Flexibility	Experimental	25.41 ± 5.15	26.65 ± 4.66	5.2500^*	0.0001
	Control	23.12 ± 3.81	22.94 ± 3.13	0.4692	0.6452
% Body Fat	Experimental	33.7306 ± 1.3172	33.7906 ± 1.2861	1.4883	0.1574
	Control	26.1347 ± 6.7357	26.1341 ± 6.7321	0.0489	0.9616
Fat Weight	Experimental	16.3676 ± 1.8165	16.3624 ± 1.8113	1.4922	0.1551
	Control	16.1618 ± 1.3381	16.1582 ± 1.3334	0.7171	0.4836
Lean Body Weight	Experimental	54.3341 ± 1.1313	54.3294 ± 1.1349	0.7831	0.4450
	Control	48.1065 ± 5.6221	48.1088 ± 5.6197	0.8456	0.4102

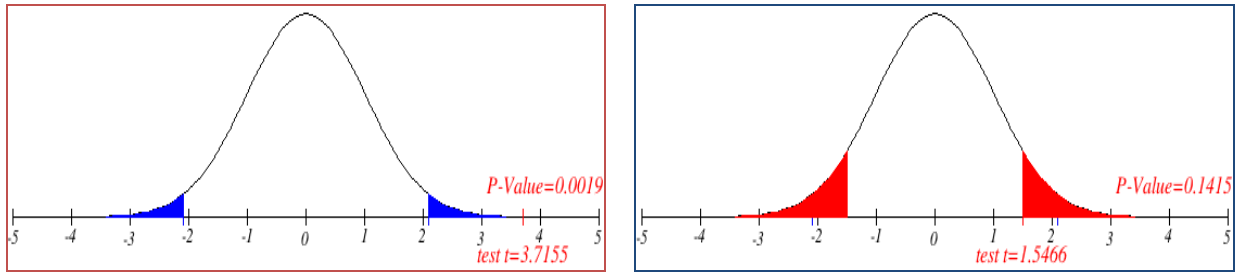


Figure 3. t-test and p-value for the Experimental (Pre-Test & Post-Test) and Control (Pre-Test & Post-Test) Groups of Health-Related Fitness (i.e., Cardiorespiratory Endurance) of University Level Girls.

4.2. Muscular Strength

The results of Components of Health-Related Fitness in group (Experimental) and group (Control) are shown in Table 3. The Mean and Standard Deviation (\pm SD) values of Muscular Strength of pre-test and post-test of experimental group were 36.29 ± 2.97 & 37.53 ± 3.04 respectively. However, the Mean and Standard Deviation (\pm SD) values of Muscular Strength of pre-test and post-test of control group were 36.18 ± 5.87 & 38.00 ± 11.91 . The t-value in case of experimental group was 1.9509 and for control group it was 0.7209.

Insignificant between-group differences were noted in Muscular Strength in the experimental group before (Pre) and after (Post) subjected to 4-weeks Chandra Nadi Pranayama Training Programme since, the calculated value of ($t=1.9509$) is less than tabulated value of $t_{.05}(16) = 2.12$ for the selected degree of freedom and level of significance. However, no significant changes over that 4-weeks period were noted in the control group.

4.3. Muscular Endurance

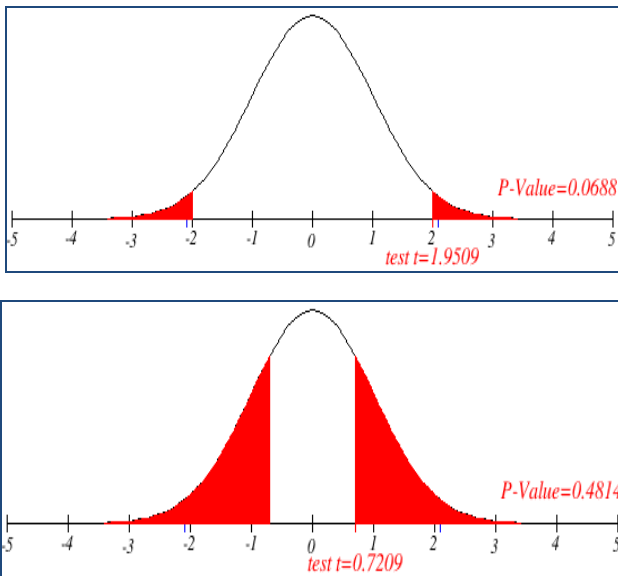


Figure 4. t-test and p-value for the Experimental (Pre-Test & Post-Test) and Control (Pre-Test & Post-Test) Groups of Health-Related Fitness (i.e., Muscular Strength) of University Level Girls.

The results of Components of Health-Related Fitness in group (Experimental) and group (Control) are shown in Table

3. The Mean and Standard Deviation (\pm SD) values of Muscular Endurance of pre-test and post-test of experimental group were 35.65 ± 2.34 & 36.18 ± 3.13 respectively. However, the Mean and Standard Deviation (\pm SD) values of Muscular Endurance of pre-test and post-test of control group were 27.82 ± 3.50 & 27.65 ± 3.10 . The t-value in case of experimental group was 1.4505 and for control group it was 0.5883

Insignificant between-group differences were noted in Muscular Endurance in the experimental group before (Pre) and after (Post) subjected to 4-weeks Chandra Nadi Pranayama Training Programme since, the calculated value of ($t=1.4505$) is less than tabulated value of $t_{.05}(16) = 2.12$ for the selected degree of freedom and level of significance. However, no significant changes over that 4-weeks period were noted in the control group.

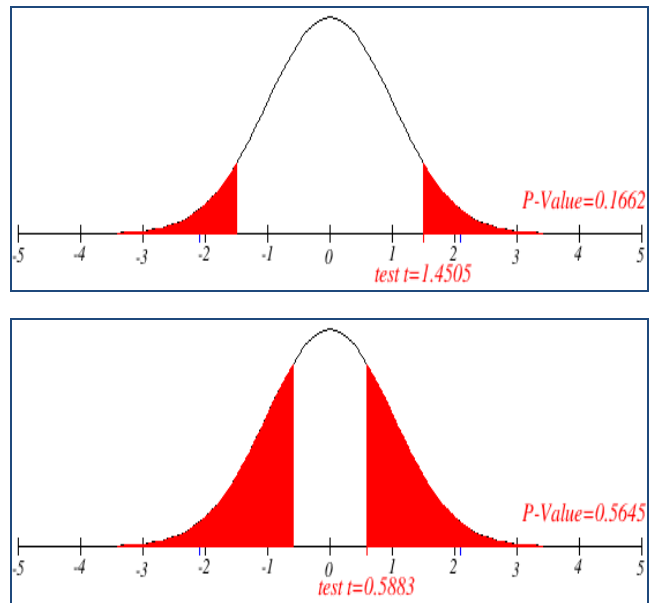


Figure 5. t-test and p-value for the Experimental (Pre-Test & Post-Test) and Control (Pre-Test & Post-Test) Groups of Health-Related Fitness (i.e., Muscular Endurance) of University Level Girls.

4.4. Flexibility

The results of Components of Health-Related Fitness in group (Experimental) and group (Control) are shown in Table 3. The Mean and Standard Deviation (\pm SD) values of Flexibility of pre-test and post-test of experimental group were 25.41 ± 5.15 & 26.65 ± 4.66 respectively. However, the

Mean and Standard Deviation (\pm SD) values of Flexibility of pre-test and post-test of control group were 23.12 ± 3.81 & 22.94 ± 3.13 . The t-value in case of experimental group was 5.2500^* and for control group it was 0.4692 .

Significant between-group differences were noted in Flexibility in the experimental group before (Pre) and after (Post) subjected to 4-weeks Chandra Nadi Pranayama Training Programme since, the calculated value of ($t=5.2500^*$) is greater than tabulated value of $t_{.05}(16) = 2.12$ for the selected degree of freedom and level of significance. However, no significant changes over that 4-weeks period were noted in the control group.

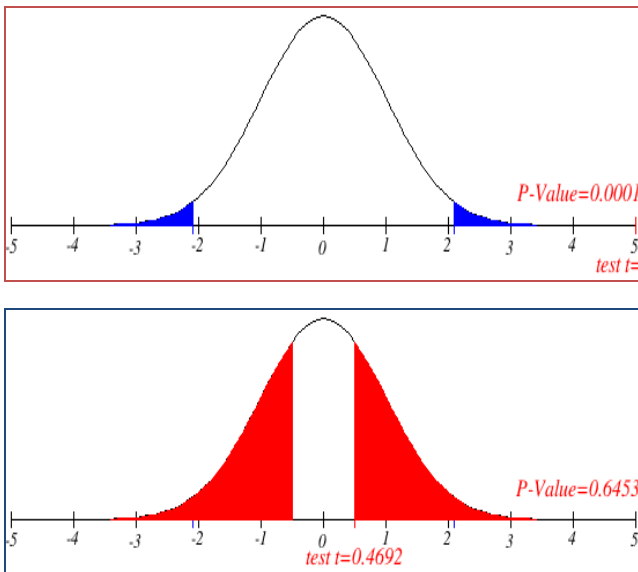


Figure 6. t-test and p-value for the Experimental (Pre-Test & Post-Test) and Control (Pre-Test & Post-Test) Groups of Health-Related Fitness (i.e., Flexibility) of University Level Girls.

4.5. % Body Fat

The results of Components of Health-Related Fitness in group (Experimental) and group (Control) are shown in Table 3. The Mean and Standard Deviation (\pm SD) values of % Body Fat of pre-test and post-test of experimental group were 33.7306 ± 1.3172 & 33.7906 ± 1.2861 respectively. However, the Mean and Standard Deviation (\pm SD) values of % Body Fat of pre-test and post-test of control group were 26.1347 ± 6.7357 & 26.1341 ± 6.7321 . The t-value in case of experimental group was 1.4883 and for control group it was 0.0489 .

Insignificant between-group differences were noted in % Body Fat in the experimental group before (Pre) and after (Post) subjected to 4-weeks Chandra Nadi Pranayama Training Programme since, the calculated value of ($t=1.4883$) is less than tabulated value of $t_{.05}(16) = 2.12$ for the selected degree of freedom and level of significance. However, no significant changes over that 4-weeks period were noted in the control group.

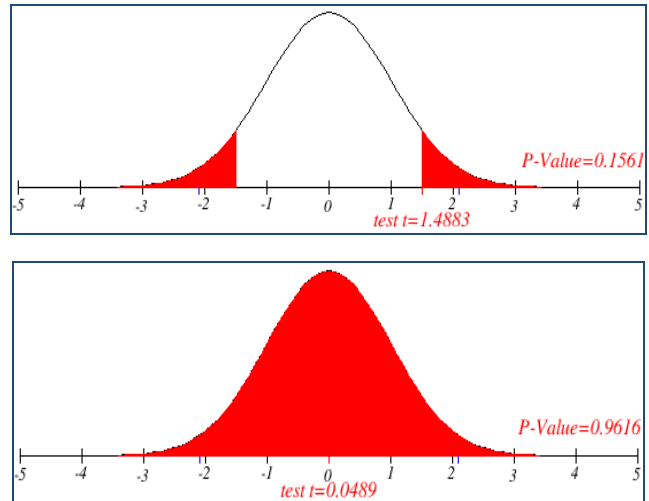


Figure 7. t-test and p-value for the Experimental (Pre-Test & Post-Test) and Control (Pre-Test & Post-Test) Groups of Health-Related Fitness (i.e., % Body Fat) of University Level Girls.

4.6. Fat Weight

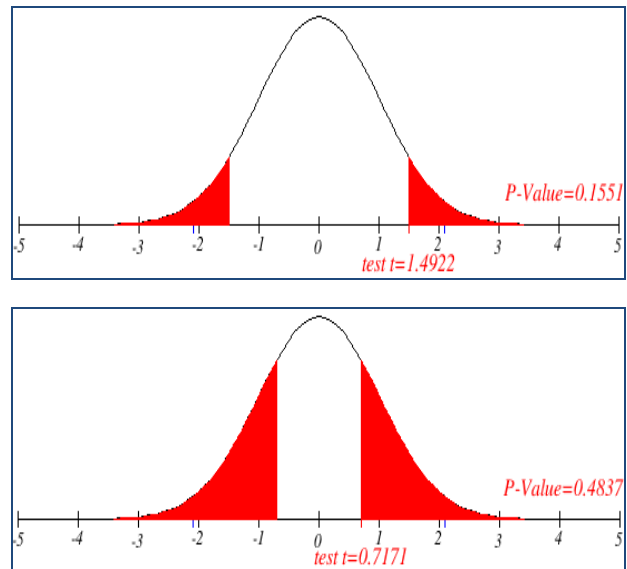


Figure 8. t-test and p-value for the Experimental (Pre-Test & Post-Test) and Control (Pre-Test & Post-Test) Groups of Health-Related Fitness (i.e., Fat Weight) of University Level Girls.

The results of Components of Health-Related Fitness in group (Experimental) and group (Control) are shown in Table 3. The Mean and Standard Deviation (\pm SD) values of Fat Weight of pre-test and post-test of experimental group were 16.3676 ± 1.8165 & 16.3624 ± 1.8113 respectively. However, the Mean and Standard Deviation (\pm SD) values of Fat Weight of pre-test and post-test of control group were 16.1618 ± 1.3381 & 16.1582 ± 1.3334 . The t-value in case of experimental group was 1.4922 and for control group it was 0.7171 .

Insignificant between-group differences were noted in Fat Weight in the experimental group before (Pre) and after (Post) subjected to 4-weeks Chandra Nadi Pranayama Training Programme since, the calculated value of ($t=1.4922$) is less

than tabulated value of $t_{.05} (16) = 2.12$ for the selected degree of freedom and level of significance. However, no significant changes over that 4-weeks period were noted in the control group.

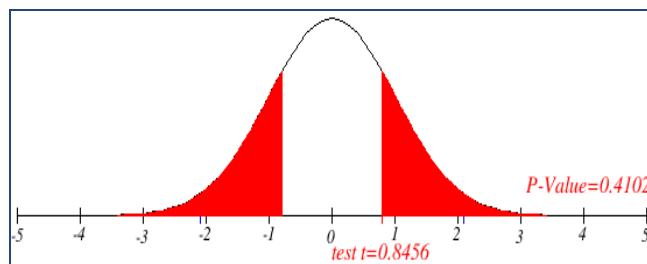
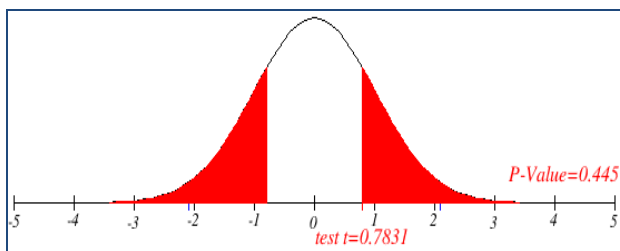


Figure 9. t-test and p-value for the Experimental (Pre-Test & Post-Test) and Control (Pre-Test & Post-Test) Groups of Health-Related Fitness (i.e., Lean Body Weight) of University Level Girls.

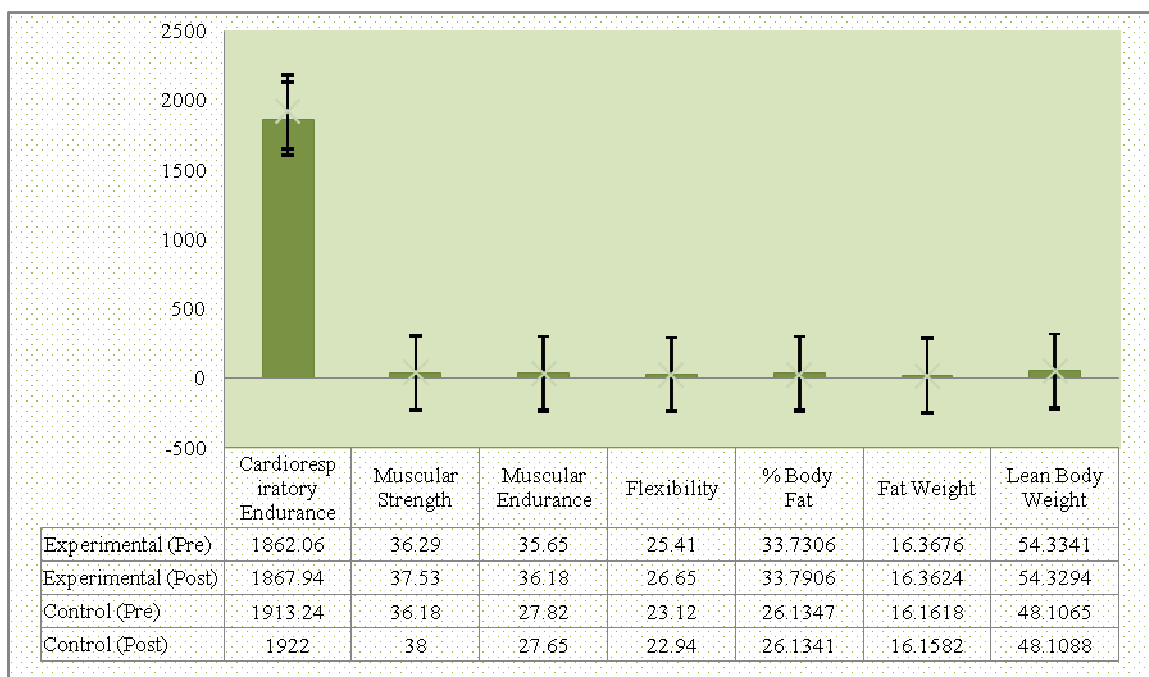


Figure 10. Mean values of Components of Health-Related Fitness (i.e., Cardiorespiratory Endurance, Muscular Strength, Muscular Endurance, Flexibility, % Body Fat, Fat Weight and Lean Body Weight) in Experimental and Control group (n=17 each) before (Pre) and after (Post) 4-weeks Chandra Nadi pranayama Training Programme (Experimental group only)

4.7. Lean Body Weight

The results of Components of Health-Related Fitness in group (Experimental) and group (Control) are shown in Table 3. The Mean and Standard Deviation (\pm SD) values of Lean Body Weight of pre-test and post-test of experimental group were 54.3341 ± 1.1313 & 54.3294 ± 1.1349 respectively. However, the Mean and Standard Deviation (\pm SD) values of Lean Body Weight of pre-test and post-test of control group were 48.1065 ± 5.6221 & 48.1088 ± 5.6197 . The t-value in case of experimental group was 0.7831 and for control group it was 0.8456.

Insignificant between-group differences were noted in Lean Body Weight in the experimental group before (Pre) and after (Post) subjected to 4-weeks Chandra Nadi Pranayama Training Programme since, the calculated value of ($t=0.7831$) is less than tabulated value of $t_{.05} (16) = 2.12$ for the selected degree of freedom and level of significance. However, no significant changes over that 4-weeks period

were noted in the control group.

5. Conclusion

Based on the analysis of the results obtained, we conclude that the significant differences were found in Components of Health-Related Fitness (i.e., Cardiorespiratory Endurance, Flexibility) of University Level Girls. Insignificant between-group differences were noted in Muscular Strength, Muscular Endurance, % Body Fat, Fat Weight and Lean Body Weight of University Level Girls.

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