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## The effect of short-term bhastrika pranayama interpolation on university level girls: a randomized analysis

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### Abstract

The purpose of this study was to examine the effect of a short-term Bhastrika Pranayama breathing technique and outcome of an intervention using the training programme to increase student's health related fitness. For the purpose of present study Sixty (n=60), 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<sub>1</sub>=30); Group-B: Control (n<sub>2</sub>=30). The subjects from Group-A: Experimental were subjected to a 4-weeks training of Bhastrika 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. % body fat, fat weight, lean body weight) of university level girls. Insignificant differences were noted in cardiorespiratory endurance, muscular strength, muscular endurance and flexibility of university level girls.

**Keywords:** Bhastrika, pranayama, prana, YMCA, cardiorespiratory

### Introduction

Mind is the master of senses, and the breath is the master of mind. Pranayama exercises are mainly the breathing exercises or the breathing techniques which helps in increasing our energy and mental focus, and it also helps in escalating our consciousness. The process of breathing is innate and an automatic procedure. Medulla oblongata controls our breath. By practicing pranayama the involuntary process of taking breath becomes a more voluntary one. Every action which we are performing is very much affected by our breathing. The breath and the mind are inter-linked to each other they are the two terms of the same article.

The breath acts as the bridge for the nervous system and by performing pranayama which helps in enhancing our breathing procedure helps to improve our mental as well as emotional states. Pranayama signifies the spirited body. It is said that pranayama is the energy department of any human system. The ancients identified five facets of pranayama. These are: Prana, Apana, Vyana, Udana, Samana.

### Material and Methods

The experimental work is planned as a surveying cross-sectional study. Sixty (n=60), 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<sub>1</sub>=30); Group-B: Control (n<sub>2</sub>=30). The subjects from Group-A: Experimental were subjected to a 4-weeks training of Bhastrika Pranayama. This lasted 4 weeks and consisted of daily morning sessions. The YMCA 3-Minute Step Test) was used to measure cardiorespiratory endurance. The (CURL-UP Test) was used to measure muscular strength and endurance, Flexibility was measured by sit and reach test and (YMCA Skin fold Test) was used for the measurement of Body Composition (i.e. % body fat, fat weight, lean body weight).

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**Table 1:** Details of 4-Weeks Bhastrika Pranayama Training Programme

| 4-weeks Bhastrika Pranayama Training |   |           |           |
|--------------------------------------|---|-----------|-----------|
| Week                                 | Schedule                                  | Time      | Duration  |
| 1 <sup>st</sup> Week                 | Preliminary Yogic Exercises               | 5 minute  | 20 minute |
|                                      | Practice of Bhastrika Pranayama (9X1 Set) | 10 minute |           |
|                                      | Relaxation Posture                        | 5 minute  |           |
| 2 <sup>nd</sup> Week                 | Preliminary Yogic Exercises               | 5 minute  | 25 minute |
|                                      | Practice of Bhastrika Pranayama (9X1 Set) | 15 minute |           |
|                                      | Relaxation Posture                        | 5 minute  |           |
| 3 <sup>rd</sup> Week                 | Preliminary Yogic Exercises               | 5 minute  | 30 minute |
|                                      | Practice of Bhastrika Pranayama (9X1 Set) | 20 minute |           |
|                                      | Relaxation Posture                        | 5 minute  |           |
| 4 <sup>th</sup> Week                 | Preliminary Yogic Exercises               | 5 minute  | 35 minute |
|                                      | Practice of Bhastrika Pranayama (9X1 Set) | 25 minute |           |
|                                      | Relaxation Posture                        | 5 minute  |           |

### Statistical Analyses

Student's t-test for independent data was used to assess the between-group differences and for dependent data to assess the Pre-Post differences. To test the hypothesis, the level of significance was set at 0.05.

### Results

Table 2. 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=30 each) before (Pre) and after (Post) 4-weeks Bhastrika Pranayama Training Programme (Experimental group only).

| Variables                   | Group        | Pre-Test             | Post-Test            | t-value | p-value |
|-----------------------------|--------------|----------------------|----------------------|---------|---------|
| Cardiorespiratory Endurance | Experimental | 1345.80 $\pm$ 141.53 | 1346.20 $\pm$ 141.63 | 0.7661  | 0.4498  |
|                             | Control      | 1256.13 $\pm$ 194.66 | 1255.77 $\pm$ 194.33 | 1.0176  | 0.3173  |
| Muscular Strength           | Experimental | 38.20 $\pm$ 4.33     | 38.60 $\pm$ 4.21     | 1.5081  | 0.1423  |
|                             | Control      | 37.80 $\pm$ 2.25     | 37.40 $\pm$ 1.79     | 1.2092  | 0.2363  |
| Muscular Endurance          | Experimental | 26.60 $\pm$ 1.69     | 27.07 $\pm$ 1.82     | 1.8158  | 0.0798  |
|                             | Control      | 28.37 $\pm$ 3.90     | 27.90 $\pm$ 3.78     | 1.7012  | 0.0996  |
| Flexibility                 | Experimental | 25.93 $\pm$ 5.96     | 26.17 $\pm$ 5.44     | 1.0218  | 0.3153  |
|                             | Control      | 22.93 $\pm$ 4.03     | 22.80 $\pm$ 3.35     | 0.4254  | 0.6737  |
| % Body Fat                  | Experimental | 31.25 $\pm$ 4.28     | 31.24 $\pm$ 4.28     | 3.3952  | 0.0020* |
|                             | Control      | 25.73 $\pm$ 7.34     | 25.72 $\pm$ 7.32     | 1.4005  | 0.1720  |
| Fat Weight                  | Experimental | 17.99 $\pm$ 1.11     | 17.98 $\pm$ 1.12     | 2.1274  | 0.0420* |
|                             | Control      | 16.49 $\pm$ 1.32     | 16.49 $\pm$ 1.32     | 1.4612  | 0.1547  |
| Lean Body Weight            | Experimental | 49.55 $\pm$ 4.42     | 49.57 $\pm$ 4.43     | 2.2355  | 0.0333* |
|                             | Control      | 49.47 $\pm$ 4.60     | 49.50 $\pm$ 4.59     | 1.0237  | 0.3144  |

### Cardiorespiratory Endurance

The results of components of health-related Fitness in group (Experimental) and group (Control) are shown in Table 2. The Mean and Standard Deviation ( $\pm$ SD) values of cardiorespiratory endurance of pre-test and post-test of experimental group were 1345.80 $\pm$ 141.53 & 1346.20 $\pm$ 141.63 respectively. However, the Mean and Standard Deviation ( $\pm$ SD) values of cardiorespiratory endurance of pre-test and post-test of control group were 1256.13 $\pm$ 194.66 & 1255.77 $\pm$ 194.33. The p-value in case of experimental group was 0.4498 and for control group it was 0.3173.

Insignificant between-group differences were noted in cardiorespiratory endurance in the experimental group before (Pre) and after (Post) subjected to 4-weeks bhastrika pranayama training programme since, the calculated value of (p=0.4498) is greater than the level of (.05) significance. However, no significant changes were noted in the experimental group.

### Muscular Strength

The results of components of health-related Fitness in group (Experimental) and group (Control) are shown in Table 2. The Mean and Standard Deviation ( $\pm$ SD) values of muscular strength of pre-test and post-test of experimental group were 38.20 $\pm$ 4.33 & 38.60 $\pm$ 4.21 respectively. However, the Mean

and Standard Deviation ( $\pm$ SD) values of muscular strength of pre-test and post-test of control group were 37.80 $\pm$ 2.25 & 37.40 $\pm$ 1.79. The p-value in case of experimental group was 0.1423 and for control group it was 0.2363.

Insignificant between-group differences were noted in muscular strength in the experimental group before (Pre) and after (Post) subjected to 4-weeks bhastrika pranayama training programme since, the calculated value of (p=0.1423) is greater than the level of (.05) significance. However, no significant changes were noted in the experimental group.

### Muscular Endurance

The results of components of health-related Fitness in group (Experimental) and group (Control) are shown in Table 2. The Mean and Standard Deviation ( $\pm$ SD) values of muscular endurance of pre-test and post-test of experimental group were 26.60 $\pm$ 1.69 & 27.07 $\pm$ 1.82 respectively. However, the Mean and Standard Deviation ( $\pm$ SD) values of muscular endurance of pre-test and post-test of control group were 28.37 $\pm$ 3.90 & 27.90 $\pm$ 3.78. The p-value in case of experimental group was 0.0798 and for control group it was 0.0996.

Insignificant between-group differences were noted in muscular endurance in the experimental group before (Pre) and after (Post) subjected to 4-weeks bhastrika pranayama training programme since, the calculated value of (p=0.0798)

is greater than the level of (.05) significance. However, no significant changes were noted in the experimental group.

**Flexibility**

The results of components of health-related Fitness in group (Experimental) and group (Control) are shown in Table 2. The Mean and Standard Deviation ( $\pm$ SD) values of flexibility of pre-test and post-test of experimental group were  $25.93\pm 5.96$  &  $26.17\pm 5.44$  respectively. However, the Mean and Standard Deviation ( $\pm$ SD) values of flexibility of pre-test and post-test of control group were  $22.93\pm 4.03$  &  $22.80\pm 3.35$ . The p-value in case of experimental group was 0.3153 and for control group it was 0.6737.

Insignificant between-group differences were noted in flexibility in the experimental group before (Pre) and after (Post) subjected to 4-weeks bhastrika pranayama training programme since, the calculated value of ( $p=0.3153$ ) is greater than the level of (.05) significance. However, no significant changes were noted in the experimental group.

**% Body Fat**

The results of components of health-related Fitness in group (Experimental) and group (Control) are shown in Table 2. The Mean and Standard Deviation ( $\pm$ SD) values of % body fat of pre-test and post-test of experimental group were  $31.25\pm 4.28$  &  $31.24\pm 4.28$  respectively. However, the Mean and Standard Deviation ( $\pm$ SD) values of % body fat of pre-test and post-test of control group were  $25.73\pm 7.34$  &  $25.72\pm 7.32$ . The p-value in case of experimental group was 0.0020\* and for control group it was 0.1720.

Significant between-group differences were noted in % body fat in the experimental group before (Pre) and after (Post) subjected to 4-weeks bhastrika pranayama training programme since, the calculated value of ( $p=0.0020$ \*) is less than the level of (.05) significance. However, significant

changes were noted in the experimental group.

**Fat Weight**

The results of components of health-related Fitness in group (Experimental) and group (Control) are shown in Table 2. The Mean and Standard Deviation ( $\pm$ SD) values of fat weight of pre-test and post-test of experimental group were  $17.99\pm 1.11$  &  $17.98\pm 1.12$  respectively. However, the Mean and Standard Deviation ( $\pm$ SD) values of fat weight of pre-test and post-test of control group were  $16.49\pm 1.32$  &  $16.49\pm 1.32$ . The p-value in case of experimental group was 0.0420\* and for control group it was 0.1547.

Significant between-group differences were noted in fat weight in the experimental group before (Pre) and after (Post) subjected to 4-weeks bhastrika pranayama training programme since, the calculated value of ( $p=0.0420$ \*) is less than the level of (.05) significance. However, significant changes were noted in the experimental group.

**Lean Body Weight**

The results of components of health-related Fitness in group (Experimental) and group (Control) are shown in Table 2. The Mean and Standard Deviation ( $\pm$ SD) values of lean body weight of pre-test and post-test of experimental group were  $49.55\pm 4.42$  &  $49.57\pm 4.43$  respectively. However, the Mean and Standard Deviation ( $\pm$ SD) values of lean body weight of pre-test and post-test of control group were  $49.47\pm 4.60$  &  $49.50\pm 4.59$ . The p-value in case of experimental group was 0.0333\* and for control group it was 0.3144.

Significant between-group differences were noted in lean body weight in the experimental group before (Pre) and after (Post) subjected to 4-weeks bhastrika pranayama training programme since, the calculated value of ( $p=0.0333$ \*) is less than the level of (.05) significance. However, significant changes were noted in the experimental group.



**Fig 1:** 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=30 each) before (Pre) and after (Post) 4-weeks Bhastrika Pranayama Training Programme (Experimental group only).

### 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. % body fat, fat weight, lean body weight) of university level girls. Insignificant between group differences were noted in cardiorespiratory endurance, muscular strength, muscular endurance and flexibility of university level girls.

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