



## IMPACT OF PILATES AND ASANAS ON CARDIOVASCULAR ENDURANCE OF OBESE

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### Abstract

Aim of the study is to determine the effects of Pilates exercises and Yogasanas on physical status variables including flexibility and cardiovascular endurance. Forty-five obese male students from Lucknow district aged 18-24 years were randomly selected for the purpose. Subjects were assigned into three groups I (Experimental A: N-15), II (Experimental B: N-15) and III (Control:N-15). The subjects from Group I and II were subjected to Six weeks yoga and Pilates training programme. Each Yoga session consisted of 25 minutes of asanas, 15 minutes of pranayama's and 5 minutes of supine relaxation is Savasana. The subjects were evaluated pre and post the Six-week training program. Analysis of covariance was used to assess the between group differences for dependent data to assess the post pre differences. Results indicated including flexibility and Cardiovascular Endurance variables including ( $P < 0.05$ ) significantly improved in group I and II compared with the control group. There was non-significant difference was found between two experimental groups for flexibility and cardiovascular endurance. These findings indicate that regular yoga and pilates practice can elicit improvements in the flexibility and cardiovascular endurance.

**Keywords:** Yoga practice, Pilates exercises, Flexibility, Cardiovascular endurance.

### Introduction

**Yoga** refers to traditional physical and mental disciplines originating in India. The word is associated with meditative practices in Hinduism, Buddhism and Jainism. Within Hinduism, it also refers to one of the six orthodox (Āstika) schools of Hindu philosophy, and to the goal towards which that school directs its practices. Major branches of yoga in Hindu philosophy include Rāja Yoga, Karma Yoga, Janna Yoga, Bhakti Yoga, and Hatha Yoga. Hatha Yoga has become increasingly popular in western countries as a method for coping with stress and as a means of exercise and fitness training (Schell et al; 1994). Hatha Yoga is an ancient practice that was developed to promote physical health as well as an awareness of one's true nature. It consists of a series of postures, called asanas, and various breathing exercises, called pranayama, which encourage balance between the physical, mental/emotional, and spiritual aspects of a human being.



## **Pilates**

Pilates was designed by Joseph Pilates, a gymnast born in Germany of partly Greek ancestry. He designed a system of exercises during the First World War with the proposal to improve the rehabilitation program for the many returning veterans. Joseph Pilates believed that mental and physical health is inter-related. He recommended a few precise movements emphasizing control and form to aid injured soldiers' in regaining their health by strengthening, stretching, and stabilizing key muscles. Pilates created "The Pilates Principles" to conditioning the entire body: proper alignment, centering, concentration, control, precision, breathing, and flowing movement.

## **Material and Methods**

Thirty randomly selected male obese students from Lucknow district aged 18-24 years, volunteered to participate in the study. Student from different private/public schools were the subjects for the current study. A written consent was obtained from the subjects. The subjects were highly motivated to participate in the present study and were allowed to quit any time. They were randomly assigned into three groups I (Experimental A: N-15), II (Experimental B: N-15) and III (Control: N-15). All subjects, after having been informed about the objective and protocol of the study, gave their written consents. Within the limitations of the present study, the investigator was selected Cardiovascular Endurance and Flexibility as dependent variables.

## **Study Protocol**

The subjects from Grp. A were subjected to a Six-week yogic exercise training program. This lasted 06 weeks and consisted of daily sessions. Each yoga session consisted of 40 minutes of asanas, Yoga Postures and 5 minutes of relaxation in savasana. The five days in a week was observed in training and Saturday – Sunday was considered as a rest days. The asanas introduced in this study included the following poses: Halasana, Chakrasana, Mayurasana, Bhujangasana, Sarvangasana, Dhanurasana, Trikonasana, SuptaVajrasana, Padmasana. The asanas focused on the quality and ease of breath isometric muscular contractions, flexibility, balance, and concentration. Each Yoga session ended with 05 minutes of Savasana to relax and cool down. Chest lift, The Hundred, The roll up. The roll up. One leg Circle, Rolling like a Ball, Open leg Balance. The Pilates exercises introduced in



this study were side kick series, front support / Plank, Saw-See, Set Up, Exhale, Curl-Up, Inhale: Reach long, press up into Swan, Release the Arms to Rock Forward.

**Variables Testing**

The bend knee sit-ups test was used to assess the flexibility. The score of the test is the distance covered by subject after normal and bending measurement. Twelve minutes run or walk test was administered to measure cardiovascular endurance. The total distance covered within 12 minutes was recorded as score.

**Data Analysis**

The Analysis of covariance and scheffe’s test was applied to compare parameters within groups. The research hypothesis of this study was tested at 0.05 level of significance.

**Results**

**Table- I: Analysis of Covariance for Pre-Test and Post-Test Data on Cardiovascular Endurance of Control Group and Experimental Groups**

|                         | Yogic Group | Pilates Group | Control Group | Sum of Squares | df | Mean Square | ‘F’ ratio |
|-------------------------|-------------|---------------|---------------|----------------|----|-------------|-----------|
| Pre-Test Mean           | 1183.3      | 1236.6        | 1146.6        | 61444.44       | 2  | 30722.22    | 1.48      |
| SD                      | 156.6       | 164.1         | 104.3         | 873000.00      | 42 | 20785.71    |           |
| Post-Test Mean          | 1280.0      | 1340.0        | 1150.0        | 283000.00      | 2  | 1415000.00  | 7.87*     |
| Adjusted Post-Test Mean | 139.9       | 151.4         | 106.9         | 755000.00      | 42 | 17976.19    |           |
| Adjusted Post-Test Mean |             |               |               | 112.14.4       | 2  | 56007.2     | 14.32*    |
| Mean                    | 1284.58     | 1300.56       | 1184.84       | 160360.5       | 42 | 3911.2      |           |

\*Significant at 0.05 level

Required Tabulated value at 0.05 level of significance for 2 & 42 degree of freedom=3.32



It is observed from table that the pre test means on cardiovascular endurance of the experimental and control group were 1183.3, 1236.6 and 1146.6 respectively. The obtained 'F' ratio value 1.48 for the pre test mean was lesser than the required table value 3.22 for 2 & 42 degrees of freedom. This reveals that there was no statistically significant difference between the control and the experimental groups on cardiovascular endurance before the commencement of the experimental training.

The post test means on cardiovascular endurance of the experimental and control groups were 1280, 1340 and 1150 respectively. The obtained 'F' ratio value 7.87\* for the post test data was greater than the required tabulated value 3.22 for 2 & 42 degree of freedom. It discloses that there was a statistically significant difference between the control and the experimental groups on cardiovascular endurance after the experimental training.

The adjusted post test means on cardiovascular endurance of the control and experimental groups were 1284.58, 1300.56 and 1184.84 respectively. The obtained 'F' ratio value 14.32 for the adjusted post test data was greater than the required tabulated value 3.22 for 2 & 42 degree of freedom. It reveals that there is significant change on cardiovascular endurance as a result of the experimental training.

**Table- II: Ordered Adjusted Cardiovascular Endurance Means and Difference between Means for Control Group and Experimental Groups**

| Yogic Group | Pilates Group | Control Group | Mean Differences |
|-------------|---------------|---------------|------------------|
| 1184.84     | 1284.58       |               | <b>99.74*</b>    |
| 1184.84     |               | 1300.56       | <b>115.72*</b>   |
|             | 1284.58       | 1300.56       | <b>15.98*</b>    |

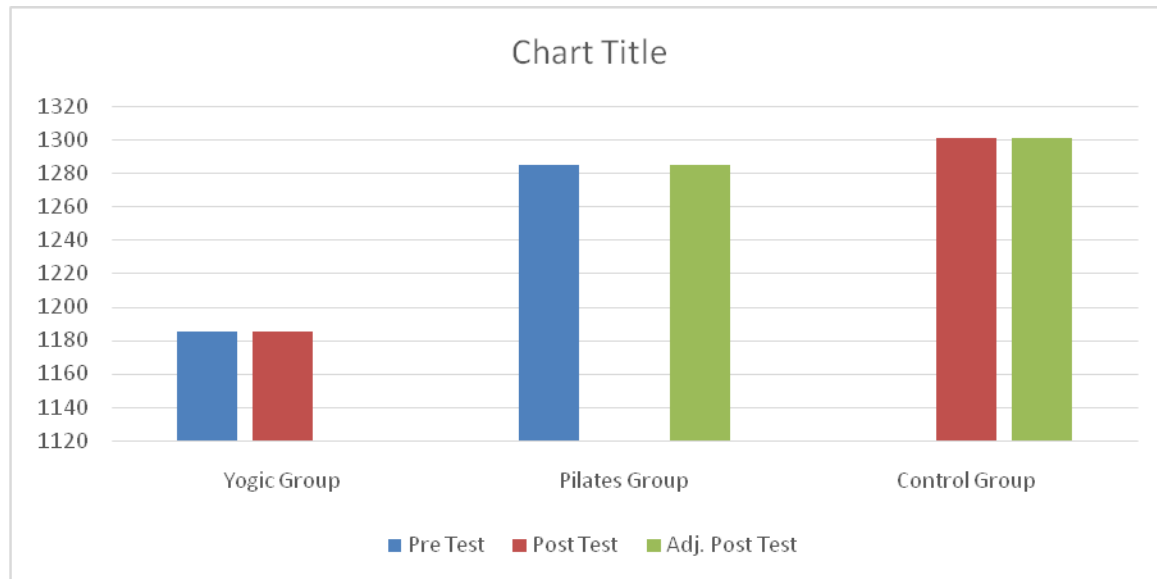
**\*Significant at 0.05 level. Scheffe's confidence Interval at 0.05 level is 0.513**

**Table II** shows the Scheffe's post-hoc method if testing the significance for the differences between the paired means, following a significant analysis of co variance for yogasana practice group, pilates exercise group and control groups. The mean differences between the yogasana practice group and pilates group 99.74\*, yogasana practice group and control group 115.72\* and pilates group and control group 15.98\* was measured, which were



significant at 0.05 level of confidence interval. This indicates that the yogasana practice group had a better improvement when compared to thee alternative day yogic practice group and control group and pilates exercise group also show significant improvement when compared to control group.

The difference in means of yogasana, Pilates group and control group is presented in fig-1



**Table- III: Analysis of Covariance for Pre-Test and Post-Test Data on Flexibility of Control Group and Experimental Groups**

|                         | Yogic Group | Pilates Group | Control Group | Sum of Squares | df | Mean Square | 'F' ratio |
|-------------------------|-------------|---------------|---------------|----------------|----|-------------|-----------|
| Pre-Test Mean           | 20.73       | 19.46         | 20.66         | 15.24          | 2  | 7.62        | 0.687     |
| SD                      | 3.12        | 3.48          | 3.37          | 266.00         | 42 | 11.10       |           |
| Post-Test Mean          | 24.80       | 21.86         | 21.33         | 104.53         | 2  | 52.27       | 5.41*     |
| SD                      | 2.88        | 3.37          | 3.03          | 405.47         | 42 | 09.65       |           |
| Adjusted Post-Test Mean | 24.41       | 22.60         | 21.00         | 87.17          | 2  | 43.59       | 47.00*    |
| SD                      | 2.88        | 3.37          | 3.03          | 405.47         | 42 | 09.65       |           |

\*Significant at 0.05 level

Required Tabulated value at 0.05 level of significance for 2 & 42 degree of freedom=3.32



It is observed from table – III that the pre test means on flexibility of the control and experimental groups were 20.66, 20.73, and 19.46 respectively. The obtained ‘F’ ratio value 0.687 for the pre test mean was lesser than the required table value 3.22 for 2 & 42 degrees of freedom. This reveals that there was no statistically significant difference between the control and the experimental groups on flexibility before the commencement of the experimental training.

The post test means on flexibility of the control group and the experimental groups were 21.33, 24.80 and 21.86 respectively. The obtained ‘F’ ratio value 5.41 for the post test data was greater than the required tabulated value 3.22 for 2 & 42 degrees of freedom. It discloses that there was a statistically significant difference between the control and the experimental groups on flexibility after the experimental training.

The adjusted post test means on flexibility of the control and the experimental groups were 21.00, 24.41 and 22.60 respectively. The obtained ‘F’ ratio value 47.00 for the adjusted post test data was greater than the required tabulated value 3.22 for 2 & 42 degrees of freedom. It reveals that there was significant change on flexibility as a result of the experimental training. Since the result has revealed that there was a significant difference, the hypothesis is accepted.

**Table- IV: Ordered Adjusted Flexibility Means and Difference between Means for Control Group and Experimental Groups**

| Control Group | Yoga Group | Pilates Group | Mean Differences |
|---------------|------------|---------------|------------------|
| 20.99         | 24.40      |               | <b>3.41*</b>     |
| 20.99         |            | 22.59         | <b>1.59*</b>     |
|               | 24.40      | 22.59         | <b>1.81*</b>     |

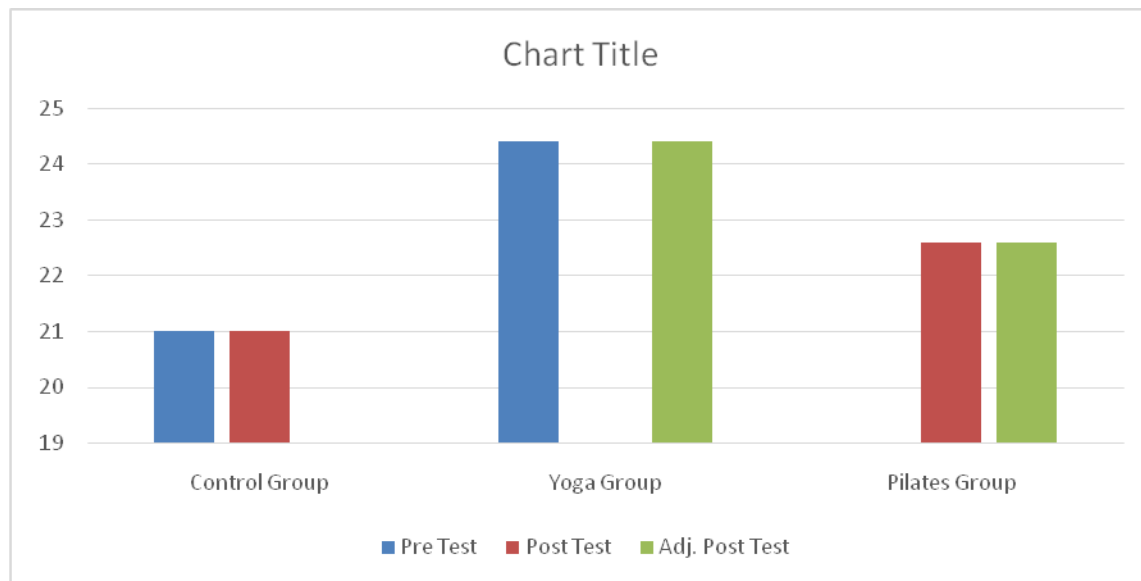
**\*Significant at 0.05 level. Scheffe’s confidence Interval at 0.05 level is 0.23**

**Table IV** shows that the Scheffe’s post-hoc method of testing the significance for the differences between the paired means following a significant analysis of covariance for yogasana group, pilates group and control groups. The mean differences between the yogasana practice group and pilates group 1.81\*, yogasana practice group and control group



3.41\* and pilates group and control group 1.59\* was measured, which were significant at 0.05 level of confidence. This indicates that the yogasana group had a better improvement when compared to the pilates and control group.

The difference in means of yogasana, Pilates group and control group is presented in fig-2



The study was conducted to find out the effects of yogasana and pilates training on flexibility and cardiovascular endurance variables. The statistical analysis results of data collected on forty-five male obese indicated that there was significant improvement in both the variables. This study shows that six week of regular yogasana and pilates practice, a tradition that has existed for at least 4500 years and is now becoming increasingly popular in the world can have significant benefits in improving the flexibility and cardiovascular endurance variables. Practitioners credit yoga for everything from improving their strength, respiration and fitness levels to “opening energy channels”. Furthermore, the positive results of this study indicate that yogasana and pilates are a form of physical activity that would meet the objectives of current recommendations to improve physical fitness with improved flexibility and cardiovascular endurance (Surgeon;1996).

### Conclusion

In Summary, the results of this investigation indicate that Six week of Yogasana and Pilates exercise can significantly improve multiple health related aspects of physical fitness in young, healthy, predominantly male subjects. More specifically, yoga and pilates exercise



training can increase flexibility and cardiovascular endurance. However, in the present study no significant difference was seen between yogasana and pilates group for the improvement of flexibility and cardiovascular endurance.

## **References**

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