# Effect of Different Durations of Pranayama on Cardiorespiratory Parameters

Kalwale P. K.[1], Khaled M. Badaam[1*], Deepmala Deore[1], Doiphode R. S.[2], Khan S. T.[3]

{[1]Assistant Professor, [2]Physicist, [3]Professor & Head} Department of Physiology, Govt. Medical College, Aurangabad (MS) INDIA.

[*]Corresponding Address:

khalid_badaam@yahoo.com

***Research Article***

***Abstract:*** With increased awareness and interest in health and natural remedies, yogic techniques including pranayama are gaining importance and becoming increasingly acceptable to the scientific community. There is evidence that pranayama training produces deep psychosomatic relaxation and improvement of cardio-respiratory efficiency. Present study was conducted in the Department of Physiology, Government Medical College, Aurangabad. Eighty (80) healthy volunteers in the age group of 35-55 years were taken in the study. Group-I subjects did pranayama under supervision of a qualified yoga teacher and practiced the same for 1 hour daily for a total duration of 8 days. Group-II subjects did same pranayama exercise under supervision of a qualified yoga teacher and practiced the same for 1 hour daily for a total duration of one month. In group-II, pranayama training produced a significant decrease in systolic blood pressure, the difference being statistically significant ($p<0.05$). On the other hand there was no significant change in systolic blood pressure in group-I. Pulse rate showed significant decrease in the group-II ($p<0.01$) whereas in the group-I there is no significant change in pulse rate. Also there is significant decrease in body weight in group-II ($p<0.001$). On the other hand there was no significant change in the body wt. in group-I. There was no significant change in diastolic blood pressure and respiratory rate in both groups. In conclusion, the present study shows that one month of pranayama training produces a significant decrease in pulse rate and systolic blood pressure. The decrease in systolic blood pressure and pulse rate may have been brought about by increased parasympathetic and decreased sympathetic activity. Decrease in body weight may be due to burning of fat during pranayama.

## Introduction

Yogasanas are static comfortable postures and pranayama is rhythmic controlled scientific method of breathing. Yogic techniques produce remarkable physiological changes and have sound scientific basis. [1, 2, 3] Pranayama, the fourth step of asthang yoga is an important component of yoga training. With increased awareness and interest in health and natural remedies, yogic techniques including pranayama are gaining importance and becoming increasingly acceptable to the scientific community. Adequate supply of oxygen is essential for the proper functioning and vitality of the cells and it is therefore vitally important to breathe correctly so that oxygen reaches to every cell of the body and correct method of breathing is taught in pranayama.

In yoga tradition, it is shown that different pranayama have different effects. There is evidence that pranayama training produces deep psychosomatic relaxation [1, 4] and improvement of cardio-respiratory efficiency. [5] Chhina GS (1974) has reported that yogis are capable of controlling their autonomic functions [6] and Raghuraj et al have found that practice of nadisuddhi pranayama results in alteration of autonomic balance. [7] Talles et al have demonstrated that breathing through left nostril results in decrease in sympathetic activity. [8]

The present study was undertaken to ascertain effect of different durations of pranayama on cardio-respiratory system.

## Material and Methods

Present study was conducted in the Department of Physiology, Government Medical College, Aurangabad. Eighty (80) healthy volunteers in the age group of 35-55 years were taken in the study. Out of these 35 were males and 45 were females. All subjects were non-smokers and were not on any medication during this study. None of the subject had been engaged in pranayama practice in the past nor were they doing any regular physical exercise or athletic activity prior to this study period.

After explaining the purpose and design of the study, informed consent was obtained from all of them. Idea about method of study was given to all of them. Subjects were divided into two groups of 40 subjects each. All the subjects were asked to sit in Vajrasana while doing Pranayama.

Group-I subjects were taught following pranayama by a qualified yoga teacher and practiced the same for 1 hour daily for a total duration of 8 days.

- Kanestha - for 3 minutes
- Madhyma - for 3 minutes
- Jyestha - for 3 minutes
- Mudra pranayamaa - for 5 minutes
- Bhastrika - for 5 minutes
- Anulom – Velom - for 3 minutes
- Dhauti - for 3 minutes
- Kapal bhati breathing - for 5 minutes
- Tribandh - for 5 minutes
- Dirgha and nadi sodhana pranayama for 10 minutes.

Group-II subjects practiced the same types of pranayama under guidance of qualified teacher for one hour daily for a total duration of one month.

Parameters recorded were –

1. Blood Pressure – Resting blood pressure was recorded in the left arm in supine position by auscultatory method using mercury sphygmomanometer.
2. Pulse rate – Right radial artery pulse rate was recorded by palpation method after a rest of 30 minutes.
3. Body weight – was measured by standard calibrated weighing machine (ISI marked).
4. Respiratory rate – Respiratory rate was recorded after a rest of 10 minutes in supine position.
5. Three readings of each above were taken after the time interval of 15 minutes and average was taken as final reading.
6. The data was subjected to statistical analysis using student's paired't' test. A 'p' value of less than 0.05 was accepted as indicating significant difference between the compared values.

## Results

**Table 1:** Baseline Characteristics

| Parameter | Group I | Group II |
|---|---|---|
| Age (years) | 42.28 ± 1.7 | 44 ± 1.63 |
| Weight (kg) | 67.36 ± 10.95 | 60.62 ± 7.01 |
| Height (cm) | 166.14 ± 2.6 | 168.85 ± 3.76 |

**Table 2:** Cardio-respiratory parameters and body weight in Group-I (8 days) and Group-II (1 month)

| Para-meters | Group-I | | | Group-II | | |
|---|---|---|---|---|---|---|
| | Before | After | 'p' value | Before | After | 'p' value |
| SBP | 105.00 ± 2.21 | 103.17 ± 2.48 | P>0.05 NS | 127.75 ± 10.63 | 113.60 ± 6.04* | P<0.05 |
| DBP | 83.20 ± 7.62 | 77.51 ± 6.44 | P>0.05 NS | 83.15 ± 7.62 | 79.81 ± 6.95 | P>0.05 NS |
| PR | 76.14 ± 2.45 | 74.64 ± 4.45 | P>0.05 NS | 73.58 ± 3.14 | 67.42 ± 3.03** | P<0.01 |
| RR | 17.4 ± 0.92 | 16.6 ± 1.41 | P>0.05 NS | 17.25 ± 1.89 | 16.6 ± 2.01 | P>0.05 NS |
| BW | 67.36 ± 10.95 | 66.03 ± 10.96** | P>0.05 NS | 60.62 ± 7.01 | 57.34 ± 7.24 | P<0.001 |

**significant, **highly significant*

The results are given in table-I. In group-II, pranayama training produced a significant decrease in systolic blood pressure, the difference being statistically significant ($p<0.05$). On the other hand there was no significant change in systolic blood pressure in group-I. Pulse rate showed significant decrease in the group-II ($p<0.01$) whereas in the group-I there is no significant change in pulse rate. Also there is significant decrease in body weight in group-II ($p<0.001$). On the other hand there was no significant change in the body wt. in group-I. There was no significant change in diastolic blood pressure and respiratory rate in both groups.

## Discussion

It has been reported that pranayama improves cardiorespiratory functions[1,4,5] and alters autonomic status.[6,7,8] Present study was undertaken to establish the effect of pranayama on cardio-respiratory system as measured by systolic blood pressure, diastolic blood pressure, pulse rate, respiratory rate and body weight. In group-II, pranayama training of one month duration resulted in a significant decrease in systolic blood pressure. In contrast, there was no change in systolic blood pressure in group-I (Table-I). Pranayama training in group-II resulted in decrease in pulse rate. On the other hand, there was no change in pulse rate in group-I. Pranayama training in group-II resulted in decrease in body weight as compared to group-I subjects. But there was no change in diastolic blood pressure and respiratory rate in both the groups. Pranayama breathing exercise has been shown to alter autonomic activity. Talles et al have demonstrated that pranayama breathing through right nostril results in an increase in sympathetic activity whereas left nostril breathing reduces it.[8] It is well known that yoga training decreases HR and BP.[1] In present study, pranayama training resulted in a statistically significant decrease in pulse rate ($p<0.01$) and systolic blood pressure ($p<0.05$). A reduction in systolic blood pressure and heart rate indicates a decrease in sympathetic activity. Raghuraj et al have reported that nadishuddi reduces sympathetic activity.[7] Our findings are consistent with Udupa et al9 who have reported a decrease in pulse rate after pranayama training. Our study finding maybe due to physiological phenomena like decrease in basal sympathetic tone and an increase in basal parasympathetic tone or in other words pranayama may tilt the autonomic balance to parasympathetic dominance. Two different exercises of pranayama namely Kapalabhati and Bhastrika pranayama help in

burning of fats and ultimately decreases the body weight which may be the cause of weight reduction in group-II after one month pranayama training.[10] There was no change in diastolic blood pressure and respiratory rate in our study and this may be due to short duration of pranayama training during the study. In conclusion, the present study shows that one month of pranayama training produces a significant decrease in pulse rate and systolic blood pressure. The decrease in systolic blood pressure and pulse rate may have been brought about by increased parasympathetic and decreased sympathetic activity. Decrease in body weight may be due to burning of fat during pranayama.

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