Chapter – III

PROCEDURE

In this chapter the selection of subjects, selection of variables, criterion measures, experimental design, collection of data, reliability of data, administration of training programme (Nostril dominance programme), administration of test and statistical techniques for analysis of data have been described.

Selection of Subjects

One hundred and twenty male students in the age group ranging between 19 to 25 years and studying in B.Ed. and B.P.E. were randomly selected as subjects from Noida College of Physical Education, Noida, (U.P.).
All subjects were randomly assigned to three experimental groups as follows:

<table>
<thead>
<tr>
<th>Groups</th>
<th>Subjects Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Control Group</td>
<td>30</td>
</tr>
<tr>
<td>B Experimental Group of Left Nostril Dominance</td>
<td>30</td>
</tr>
<tr>
<td>C Experimental Group of Right Nostril Dominance</td>
<td>30</td>
</tr>
<tr>
<td>D Experimental Group of Both Nostril Dominance</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
</tr>
</tbody>
</table>

**Selection of Variables**

The research scholar went through all the scientific literature pertaining to Yoga and Physical Education from books, magazines, journals and periodicals available in the library of Lakshmibai National Institute of Physical Education, Gwalior, G.S. College of Yoga and Cultural Synthesis, Kaivalayadhamma, Lonavāla, and Noida College of Physical Education, Noida. Keeping in view the feasibility of criteria and the relevance of the study the following variables were selected.
A  Physical Variables

1. Vertical Jump

2. Chin-ups

3. Shuttle Run

B  Physiological Variables

1. Peak Flow Rate

2. Vital Capacity

3. Blood Pressure (Systolic, Diastolic)

4. Hemoglobin content

5. Resting Heart Rate

6. Maximum Heart Rate

7. Maximal Oxygen Uptake (Vo_2 max).

8. Respiratory Rate

9. Physical Work Capacity
Criterion Measures

To find out the effect of Nostril dominance on selected physical and physiological variables, the following tests were selected and their scores were considered as criterion measures for this study.

1. The vertical jump was measured to the nearest half inch.

2. The chin-ups was scored by the number of completed chin-ups.

3. The shuttle run test was recorded in seconds.

4. The peak flow rate was measured in litres per minutes.

5. The vital capacity was recorded in litres.

6. The blood pressure was measured in mm. Hg.

7. The hemoglobin content of the blood was recorded in grams per 100 ml of blood.

8. Heart rate was measured in beats per minute.

9. The \( \text{Vo}_2 \text{max} \) was recorded in Litres.
10. The respiratory rate was recorded in total count of respiratory movement counts per minute.

11. The physical work capacity was measured by kilometers per hour.

Experimental Design

Random group design was adopted for this study and all the subjects were divided into four groups. Further, the experimental treatments were also assigned at random to the three experimental groups and one group served as a control group. The experimental groups participated in three training programmes, i.e., (left nostril dominance, right nostril dominance and both nostrils dominance). The yogic training was carried out for a total duration of twelve weeks.

Collection of Data

The data was collected for each variable by administering the respective tests. The tests were administered at the play fields of Noida College of Physical Education, Noida (U.P.). To ensure that the data collected was reliable, each subject was given sufficient number of trials to perform the respective tests for each variable. The data was collected before the start of the experimental treatment (Pre-test) and end of six weeks and
twelve weeks training period (Post-test). The tests used were explained to the subjects prior to their administration. The subjects were given a chance to become familiar with the test through practice.

Reliability of Data

All the instruments and equipments used were purchased from standard agencies and companies.

Tester Competency and Reliability of Data

The tester competency was evaluated together with the reliability of tests. Test-retest method was employed to determine reliability of the scores of subjects. The scores of subjects in the various tests were recorded on two days with a gap of one day in between under identical conditions.

Pearson’s product moment correlation was computed between the two measures of each variables and the reliability co-efficient are shown in Table – 1. It was observed that the tester’s reliability was significantly high, establishing the competency of the scholar to administer the tests.
### Table - 1

Co-efficient of Reliability of Different Variables

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Variables</th>
<th>Control Group</th>
<th>Left Nostril Dominance</th>
<th>Right Nostril Dominance</th>
<th>Both Nostril Dominance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre-Test</td>
<td>Post-Test</td>
<td>Pre-Test</td>
<td>Post-Test</td>
</tr>
<tr>
<td>1.</td>
<td>Vertical Jump</td>
<td>.91*</td>
<td>.87*</td>
<td>.88*</td>
<td>.89*</td>
</tr>
<tr>
<td>2.</td>
<td>Chin-ups</td>
<td>.92*</td>
<td>.86*</td>
<td>.90*</td>
<td>.93*</td>
</tr>
<tr>
<td>3.</td>
<td>Shuttle Run</td>
<td>.87</td>
<td>.88*</td>
<td>.92*</td>
<td>.92*</td>
</tr>
<tr>
<td>4.</td>
<td>Peak Flow Rate</td>
<td>.94*</td>
<td>.90*</td>
<td>.86*</td>
<td>.94*</td>
</tr>
<tr>
<td>5.</td>
<td>Vital Capacity</td>
<td>.88*</td>
<td>.92*</td>
<td>.93*</td>
<td>.92*</td>
</tr>
<tr>
<td>6.</td>
<td>Blood Pressure</td>
<td>.85*</td>
<td>.91*</td>
<td>.88*</td>
<td>.90*</td>
</tr>
<tr>
<td>7.</td>
<td>Hemoglobin</td>
<td>.90*</td>
<td>.89*</td>
<td>.93*</td>
<td>.88*</td>
</tr>
<tr>
<td>8.</td>
<td>Heart Rate</td>
<td>.87*</td>
<td>.86*</td>
<td>.87*</td>
<td>.87*</td>
</tr>
<tr>
<td>9.</td>
<td>VO₂ Max.</td>
<td>.88*</td>
<td>.88*</td>
<td>.86*</td>
<td>.88*</td>
</tr>
<tr>
<td>10.</td>
<td>Respiratory Rate</td>
<td>.93*</td>
<td>.87*</td>
<td>.90*</td>
<td>.90*</td>
</tr>
<tr>
<td>11.</td>
<td>Physical Work Capacity</td>
<td>.92*</td>
<td>.85*</td>
<td>.92*</td>
<td>.89*</td>
</tr>
</tbody>
</table>

Significant at .01 level
N=30
\( r.01 (28) = .463 \)
Administration of Training Programme

All the subjects were assembled at the play field of Noida College of Physical Education, Noida, (U.P.) and were briefed on the three types of training.

The three experimental groups (B, C & D) were administered three types of practices i.e left nostril dominance, right nostril dominance and both nostrils dominance group. Group A did not participate in any kind of practice except attending the regular college programme. The three experimental groups also participated in the regular college programme.

The training was conducted for a period of twelve weeks, five days a week excluding the time consumed for conducting pre-test and post test. The scholar demonstrated the training to each group, all the subjects of the experimental groups participated in their respective training programme. Sufficient and required recovery time was provided in between the tests.

The training programme was administered in the building of Noida College of Physical Education, Noida by the investigator himself.

The programme was administered for a period of twelve weeks, five days a week. The subjects were classified into four groups (A, B, C, D) consisting of 30 subjects each. Group A was the control group and B, C, D
groups were the experimental groups. Three types of experimental training programmes were developed after an exhaustive consultation with experts, through literature review and critical deliberation with exercise physiologist and test and measurement specialists.

Nostril dominance training programme of three variations was developed after initial practised feasibility testing. For each experimental group (B, C, D) respectively left nostril dominance, right nostril dominance and both nostrils dominance, specific training programme's were developed. Each programme contained of at least 10 asanas with one relaxative asana, one pranayama and yoga danda practices.

In addition to the twelve weeks training programme which was conducted one extra week was devoted initially for orienting the subjects to each aspect of the training programmes.

Training programmes were personally supervised by the research scholar and his two assistants through out the twelve weeks duration.

The details of the training programme were as follow;

1. Five days a week training session;

2. Each session of training was of 50 minutes duration;

3. Total training programme was of twelve weeks duration.
Contents of training programme for each experimental group were as follows :-

1. **LEFT NOSTRIL DOMINANCE**:

**Procedure**: The subjects in appropriate dress were instructed to lie down in supine position (Shavasana) for 2 minutes. Then they were directed to perform asanas towards their right side like vakrasana, ardhamatsyendrasana, janushirasana (figure-1), akarnadanurasana, gomukasana, garudasana, vrikshasana, konasana, trikonasana and standing katichakrasana for 35 minutes. The subjects were asked to do chandrabedan pranayama for 5 minutes. Then the subjects were asked to turn their body towards their right side for 3 minutes. (figure -2). Yogadanda was kept towards right side of the armpit for 5 minutes. It was assumed that they were left nostril dominated.

**Scoring**: The subject's nostril breathing was checked and it was confirmed as the nostril dominance. A mirror technique was used to assess the nostril dominance. The percentage of left nostril dominance as indicated by the impression of the subjects expired air remained on the mirror was recorded.
Figure: 1

JANUSHIRASANA

Figure: 2

BODY POSITION
2. **RIGHT NOSTRIL DOMINANCE:**

**Procedure:** The subjects in appropriate dress were instructed to lie down in supine position (Shavasana) for 2 minutes. Then they were directed to perform asanas towards their left side like vakrasana, ardhamatsyendrasana, janushirasana, akarnadanurasana, gomukasana, garudasana, vrikshasana, konasana, trikonasana and standing katichakrasana for 35 minutes. The subjects were asked to do Suryabedan pranayama for 5 minutes. Then the subjects were asked to turn their body towards their left side for 3 minutes. Yogadanda was kept towards left side of the armpit for 5 minutes. It was assumed that they were right nostril dominated (figure -3).

**Scoring:** The subject's nostril breathing was checked and it was confirmed as the nostril dominance. A mirror technique was used to assess the nostril dominance. The percentage of right nostril dominance as indicated by the impression of the subjects expired air remained on the mirror was recorded.
Figure: 3 (a)

YOGA-DANDA
Figure: 3 (b)
MIRROR TECHNIQUE

Figure: 3 (c)
CIRCLES ON MIRROR MEASURING NOSTRIL DOMINANCE
3. **BOTH NOSTRIL DOMINANCE:**

**Procedure:** The subjects in appropriate dress were instructed to lie down in supine position (Shavasana) for 2 minutes. Then they were directed to perform asanas like vipritkarni, halasana, bhujangasana, salbhasana, dhanurasana, paschimottansana (figure-4), yogamudra, vakasana, mayurasana and padahastasana for 35 minutes. The subjects were asked to do Anulom viloma pranayama for 5 minutes. Then the subjects were asked to take rest for 3 minutes. Yogadanda was kept towards both sides of the armpit for 5 minutes. It was assumed that they are both nostrils dominated.

**Scoring:** The subject’s nostril breathing was checked and it was confirmed as the nostril dominance. A mirror technique was used to assess the nostril dominance (figure – 5). The percentage of both nostrils dominance as indicated by the impression of the subjects expired air remained on the mirror was recorded.
Figure : 4

PASCHIMOTTANSANA

Figure : 5

MEASURING NOSTRIL DOMINANCE OF THE SUBJECTS
Administration of Test Items

Vertical Jump

**Equipment**: black board, Chalk-power, weighing tape

**Description**: The subject is asked to stand erect facing the board. His dominant hand’s fingertips are marked with chalk powder and the subject is asked to raise the marked fingertips to a maximum height on the blackboard without lifting the heels so as to mark his maximum reach point. The fingertips are rechalked. With the chalked hand side towards the wall, a vertical jump is to be performed by the subject to make another mark at the maximal height of the jump. The subject is not allowed to run or hop. However, the subject is properly instructed to take a good jump by bending the knees and swinging the arms. The subject may be given three to five trials at his will and the best performance is considered.

**Scoring**: The maximum distance (among all the trials) between the reaching height and the jumping height provides the score of the test.

Chin-Ups

**Equipment**: Metal-bar, stop watch.

**Description**: The height of the bar should be such that when the subject hangs from it with fully extended arms, his feet do not touch the ground. The
subject is asked to use an overhand grasp with the palms facing away from the body. From the hanging position, the pupil raises the body by the arms until the chin can be placed over the bar and then lowers the body to a full extension hang and repeats the pull ups as many times as possible. Only one trial is given unless it is obvious that the pupil has not had a fair chance. Neither swinging, not kicking the legs nor knee raising is allowed.

**Scoring** : The number of completed chin-ups.

**Shuttle Run (Agility)**

**Equipment** : Two blocks of wood, a stopwatch and marking powder.

**Description** : Two parallel lines are marked on the floor 10 Meters apart. The two wooden blocks are placed behind one of the lines. The subject is asked to start from behind the other line. On the signal ‘go’ the timer starts the watch and the subject runs towards the blocks, picks-up one block, runs back to the starting line, places the block behind the starting line, runs back and picks-ups the second block to be carried back across the starting line. As soon as the second block is placed on the ground the timer stops the watch and records the time.

**Scoring** : Two trials are allowed to each subject with some rest in between. The time of the better of the two trials is recorded to the nearest 10th of a second as the score of the test item.
Peak Flow Rate

**Equipment**: Peak Flow Meter

**Description**: The peak flow rate of the subject was measured by the using a peak flow meter. The measurement was taken of the subject in a standing position. The tester ensured that when the subject held the instrument in his hands ready for blowing the slot placed away from the hand and the flattened part of the plastic mouthpiece was horizontal. The tester also ensured that when the free movement of the marker over the scale. The instrument measured the peak expiratory flow in liters per minute.

The subject was asked to take a maximum deep breath and then air was blown into mini flow meter through the mouthpiece.

The subject was instructed to blow as hard as and fast as possible into the mouthpiece. The action was best described as hard huff. Best of the three trials were recorded in liter/min. The mouthpiece was sterilized with rectified spirit after the every three trials of each participant.

**Scoring**: The best of the three trails were recorded in liter/min were the final score of the subject.
Vital Capacity

**Equipment:** Dry Spiro-meter

**Description:** Vital capacity was measured with the help of Dry Spiro-meter. It was ensured that the pointer of the scale was at the zero mark at the beginning of the test. The subject took a deep breath before starting the test, and then after the fullest inhalation the subject placed the mouthpiece attached to the house connected to the air escaped through the edges of the mouthpiece.

The subject exhaled slowly and steadily while bending forward slightly until the maximum volume of air could be expelled without taking a second breath. The subjects were instructed that they should blow out only through the mouth not by the nose—clip to prevent the air from escaping through the nose. **Scoring:** The scores of vital capacity for each subject were recorded in liters.
Blood Pressure (Systolic & Diastolic)

**Equipment**: Blood Pressure Cuff, Sphygmomanometer, Chair for subject to sit in and stethoscope.

**Description**: A hollow cuff (Blood pressure cuff) is wrapped around the left brachial artery. By inflating the cuff to a pressure higher than the expected pressure in the artery, blood flow is restricted. Slowly releasing the year from the cuff well reduce the pressure in the cuff. The Systolic pressure reading is measured at the cuff pressure (mmHg) at which sounds of blood flow are first heard. The diastolic pressure is measured at the point (mmHg) at which the sounds (vibrations) of blood cease.

**Scoring**: Both systolic and diastolic blood pressure are measured with the use of sphygmomanometer. Reading are expressed in units of millimeters of mercury (mmHg).

Hæmoglobin Content

**Equipment**: Sahil's Hæmoglobinometer

**Description**: Sahil's Acid Haematin method was used for the estimation of hemoglobin content of the blood.
The hemoglobin pipette the hemometer tube and stirrer were thoroughly cleaned and dried. In the hemometer tube N/10 hydrochloric acid was taken up to the 20\textsuperscript{th} division on the comparator in the space provided for it. The pricking needle was sterilized by scabbing it with rectified spirit. The top of the left ring finger of the subject was cleaned by using spirit. The finger was allowed to dry up and then punctured boldly with the pricking needle. Exactly 20 cubic ml. of blood was drawn into the piped by sanction.

The pipette was then dipped into N/10 hydrochloric acid by contained in the hemometer tube and thoroughly mixed by rinsing the pipette with the acid several times.

The tube was allowed to stand in the comparator for about ten minutes for the maximum development of the colour. Distilled water was added to solution it was stirred to ensure through mixing, when the colour of the mixture matched with that of the standard, the tube was taken out of the comparator and the stirrer was removed from the tube. The reading on the hemoglobin scale on the tube was taken at the level of the lower meniscus of the solution, avoiding parallel error and recorded.

\textbf{Scoring} : The scale was provided in grams of hemoglobin content per 100ml of blood.
Resting Heart Rate

**Equipment** : Stopwatch

**Description** : The resting heart rates of the subject were measured under complete resting condition. The data pertaining to resting heart were collected early in the morning between 6:00 a.m. to 7:00 a.m. The time taken normally when the subject awake-up from the bed. The subjects were asked to remain in lying position and by placing the two middle fingers of the right-hand on the thumb side of the subject wrist.

**Scoring** : Resting heart rate was recorded as number of pulse beats per minute.

Maximum Heart Rate

**Equipment** : Stopwatch and treadmill.

**Description** : During the optimum level of intensity treadmill running. The subject were called off to take the heart rates. The subject were instructed to sit on the chair by using the palpatory method (pulse rate count), placing the three middle fingers were put on the radial artery of the subject left-wrist. The pulse was counted for 60 seconds.
**Scoring**: Maximum heart rate was recorded as number of beats per minute during exercise workload.

**Maximal Oxygen Uptake (Vo₂ Max.)**

**Equipment**: Stepping bench, stopwatch and weighing machine.

**Description**: Give a demonstration of the four count 'up-up-down-down-' step test to be performed. The subjects are asked to get ready for the exercise. At the signal 'Go' the subjects start stepping up-up-down-down (four count per step exercise) and the timer switches on the stopwatch. After one minute of exercise the timer announces, 'stop for pulse count', the counter/counters take down the pulse count, of 15 seconds in a standing position, and announce for the restart of exercise. Thus, the pulse count is taken after each minute of exercise which is usually continued for 5 minutes. If the pulse count of two consecutive minutes of exercise is same, it is considered to have reached a steady stage. In case the steady stage is not reached, the pulse count after the fifth minute is considered for the scoring.

**Scoring**: The pulse count thus obtained and the body weight is marked on a tracing paper placed over the Astrand-Rhyming nomogram. (Figure -6)
Figure 6. This figure shows the adjusted nomogram for calculation of aerobic work capacity from submaximal pulse rate and O2 uptake values (cycling, running or walking and step test). In tests without direct O2 uptake measurement, it can be estimated by reading horizontally from the "body weight" scale (step test) or "workload" scale (cycle test) to the "O2 uptake" scale. The point on the "O2 uptake" scale (Vo2) shall be connected with the corresponding point of the "pulse rate" scale and the predicted maximal O2 uptake read on the middle scale. A female subject (61 kg.) reaches a heart rate of 156 at step test; predicted max Vo2 = 2.4 L. A male subject reaches a heart rate of 165 at cycling test on a work load of 1200 kpm/min; predicted max Vo2 = 3.6 L (exemplified by dotted lines).
Respiratory Rate

Equipment: Stopwatch

Description: The subjects were asked to lie down supine position and to keep the body relaxed, maintaining normal breathing to regulate respiration. Subjects were asked to take heavy breathing to facilitate the movement of air in and out of the lungs. The investigator then recorded the subject’s respiration rate in unit counts per minute by carefully watching the movements of the subjects abdomen and counting the respiratory movements per minute.

Scoring: The number of abdomen movement (up and down) was recorded as the respiratory rate.

Physical Work Capacity

Equipment: Treadmill, Stopwatch and Weighing machine

Description: Physical work capacity of each subject was expressed in terms of total work output in kilometers, on a treadmill. The treadmill used for testing physical work capacity in this study was supplied by M/s. Venkey Engineering Works, Madras. The maximum possible speed of the treadmill was 20 km/hr. and the maximum inclination 10 percent.
The subjects were permitted to practice running on the treadmill before the test was administered. The weight of each subject was checked by a weighing scale and recorded in kilograms. The weighing was done with the sports kits of the subjects for treadmill running for the purpose of this study, the inclination was set at four percentage of speed at 8 km/hr. The subjects were permitted to run on the treadmill either barefooted or in canvas shoes. Each subject was asked to stand on the treadmill, and after a word of caution "ready" the investigator switched on the treadmill, gradually increasing one minute of speed to 8 km. per hour, as indicated by the speedometer. The stopwatch was started simultaneously as the treadmill started. The subject also gradually picked up his speed of running with the treadmill to 8 km. per hour, as the set speed of the treadmill. The subject continued the treadmill running exercise at this speed as long as possible. He was instructed to give a signal or press the emergency button to stop the treadmill, if he felt completely exhausted and could no longer continue running at this speed. At the signal from the subject the investigator stopped the treadmill and the stopwatch. Each subject was encouraged to do his best. For each subject the total running time in seconds less than 60 seconds was recorded as the performance time for this test.
Scoring: This work out put for each subject was calculated by the following formula:

\[ \text{Workoutput (kg.m) = } L \times C_1 \times S \times C_2 \times A \times W \]

L is the length of the run in minutes. \( C_1 \) is a correction factor (hr/60 minute) to convert the length of the run in minute to part of an hour, S is the speed of the treadmill in km/hr. \( C_2 \) is the correction factor (1000/km) to convert km/hr. to meters per hour. A is the sign of the treadmill percent grades, and W is the weight of the subjects in kilograms.

Statistical Technique for Analysis of Data

The data collected on all the parameters viz., pre-test and post-test (after six weeks and twelve weeks) were subjected to following statistical analysis to find out effects of yogic training for experimental groups.

The pre and post test after six weeks of yogic training were subjected to t-ratio test to find out significance of mean difference between pre and post test for each variables. Further Analysis of Co-variance was employed to analyse yogic training effect after twelve weeks of yogic training. The level of significance was kept at 0.05 level.

Further graphical presentation was also made for ready reference comparison and highlight mean values in each parameter with respect to pre and post test.