Chapter III

PROCEDURE

In this chapter, the selection of the subjects, selection of variables, criterion measures, administration of the test, collection of data, reliability of data, administration of training programme, training schedule, design of the study, statistical procedure and level of significance employed for analyzing the data have been described.

Selection of the subjects

One hundred out of three hundred male students of A.K.P.C. Mahavidyalaya, Bengai, Dist- Hooghly, West Bengal, were randomly selected as the subjects for this study. The average age of the subjects was 18 years and 6 months ranging from 18 years and 2 months to 19 years.

The subjects participated voluntarily in the programme and before the commencement of the programme, all of them were examined by the physician to ascertain that they were free from any type of medical problems and were fit enough to go through Aerobic training, Hatha yoga training and combination of Aerobic and Hatha yoga training programmes for ten weeks. After that they were divided
into four equal groups on random basis (Groups A, B, C & D) consisting of 25 subjects in each group. Three out of the four groups were given experimental treatments i.e. Aerobic training, Hatha yoga and combination of hatha yoga and aerobic training and thereafter the groups A, B, C were designated as Aerobic training group, Hatha yoga group and combination of hatha yoga and aerobic training groups respectively. While the remaining one group (Group- D) was designated as control group, which was not given any experimental treatment.

The importance of the procedure and the significance of the study were explained to the subjects in brief and they were asked to act voluntarily as the subjects. Different types of incentives were announced to motivate and encourage them to continue training programme and to give the tests up to the best of their capacity.

**Selection of variables**

The selection of physiological variables, psychological variables and physical fitness were made by considering the following criteria.

1. Through review of all the available scientific literatures, pertaining to the effect of Hatha yoga, aerobic training and
combination of hatha yoga and aerobic training on physiological variables, psychological variables and physical fitness.

2. Through discussions with the experts and the advisor of the scholar regarding the effectiveness of hatha yoga, aerobic training and combination of hatha yoga and aerobic training on the chosen variables.

3. Feasibility in terms of availability of instruments and measuring techniques and acceptability of the test items were discussed with the experts and supervisors.

The specifications of the variables based on such criteria are stated below:

**Physiological variables**

i) Resting Breathing frequency

ii) Resting Heart rate

iii) Resting Blood Pressure

   a) Resting Systolic blood pressure

   b) Resting Diastolic blood pressure

iv) Vital capacity
Psychological variables

i) Stress

ii) Anxiety

iii) Personality

Physical fitness

AAHPERD Youth Fitness Test

Criterion Measures

The following criterion measures were used in the present study.

Physiological variables

1. Breathing frequency was measured by counting the number of breaths for a minute i.e. by counting how many times the chest expends for each of the subjects and was recorded in number.

2. Resting heart rate was measured by counting the beats of radial pulse in a minute and was recorded in number.

3. Resting Blood pressures (resting systolic and resting diastolic) were measured by using sphygmanometer with stethoscope and the scores were recorded in millimeters of mercury (mm/Hg).
4. Vital capacity was measured by a wet spirometer and which was recorded in litres.

*Psychological variables*

1. Stress: - Score obtained by the subjects on (SPSSI) Stress Questionnaire test was considered as stress scores of the individual.

2. Anxiety: - Score obtained by the subjects on (TAS) Anxiety Questionnaire test was considered as anxiety scores of the individual.

3. Personality: - Score obtained by the subjects on cattles16 P.F. Questionnaire test was considered as personality scores of the individual.

*Physical fitness*

The physical fitness ability of the subjects was measured by conducting AAHPERD youth fitness test. There after all the raw scores of six items of the test obtained by each subject were converted in to standard scores. Then by adding all the standards scores of each item of the test of each subject, the composite physical fitness score were obtained which was recorded in number.
Administration of Tests

In respect to the physiological variables, psychological variables and physical fitness all the tests were administered to the subjects at the A.K.P. C. Mahavidyalaya, Dist- Hooghly (West Bengal). The research scholar took the help of six experienced lecturers in physical education, five Ph.D scholars in physical education and three experienced athletic coaches. Assistance of them was well-oriented by the research scholar himself and by the supervisor of the thesis a few days before the administration of the tests.

Prior to the actual administration of the tests, all the subjects were introduced with the tests and the necessary numbers of practice trails were provided to each subject to make them familiar to the actual conduct of the test.

The entire test was administered in the morning from 6.00 a.m. to 10.00 a.m. at the college ground, on two consecutive days.

Collection of Data

Physiological variables

Resting Breathing Frequency

Equipment:

Stop Watch.
Procedure:

Resting breathing frequency test was taken early in the morning. The subjects were asked to rest in supine lying position on their bed. The resting breathing frequency was felt by placing the hand just below the thoracic cavity. The research scholar used stop watch for taking the Breathing frequency.¹

Scoring:

Total number of inhalation per minute was recorded for each of the subjects.

Resting Heart Rate

Equipment:

Stop watch.

Procedure:

The data was collected while the subjects were in bed at dawn. The resting heart rate was counted by palpitating at the carotid artery in pre-abortive condition.²

Scoring:

The score was recorded in number of beats per minute.

² Larry G. Shaver, “Essential of Exercise Physiology” (Delhi: Surjeet publication, 1981), p.84.
Resting Blood pressure (Systolic & Diastolic)

Equipments:

Sphygmomanometer, Stethoscope.

Procedure:

After the completion of recording heart rate at bed at dawn, the blood pressure was recorded in the same sitting. The objective of this test was to measure the systolic and diastolic blood pressure at rest.

Each subject was made to lie down at bed in a relaxed and placid mood for about 15 minutes so that his circulatory system got enough time to come back to normal.

The cuff of the sphygmomanometer was wrapped around the left upper arm of the subject just above the elbow. The cuff was then fixed to the pump and the manometer (while taking blood pressure the left arm was fully bared to make sure that obstruction did not constrict the blood vessels. The measurement of pressure was taken with the subject in a lying down position. Here fore-arm was laid relaxed on the bed). The stethoscope receiver was placed over the artery in antecubital space. The cuff was inflated until the artery was fully pressed to the extent that no pulse beat could be heard.
*Scoring:*

While the investigator had been watching the dial, the pressure was then slowly released. When the first sound of the pulse became audible, the reading in millimeters of mercury (mm/Hg) instantly was recorded as the systolic blood pressure.

The pressure was further released gradually, as the sound of the pulse changed in intensity and quality. The index of diastolic pressure was noted in mm/Hg, when the heart sound was being completely ceased.³

**Vital Capacity**

*Equipment:*

Wet spirometer

*Procedure:*

The spirometer was equipped with a good length of a rubber hose (35 to 42 inches). The spirometer was fitted with water within one inch of the top and was placed at a height where by all subjects can stand erect at the beginning of the test. The mouth piece was disinfected by an antiseptic solution after use by each subject.

³ Larry G. Shaver, "Essential of Exercise Physiology" (Delhi: Surjeet publication, 1982), pp. 102-104.
The subject was asked to take a deep breath before the test, then after the fullest possible inhalation the subject exhaled slowly and steadily bending forward over the hose, fill all the air within his control was expelled. Care was taken to prevent air from escaping either through the nose or around the edges of the mouth piece and was also ensured that a second breath was not taken by the subject during the test. In case of doubt this test was repeated.\footnote{Wayne. E. Sinning and peter V. Karpovich, "Physiology of Muscular Activity 7th ed." (Philadelphia: W.B. Saundes company,1971), p. 151.}

**Scoring:**

The score was recorded in litres as indicated by the scale attached with the wet spyrometer.

**Psychological Variables**

**Stress**

Singh Personal Stress Source Inventory (SPSSI) Questionnaire developed by A.K. Singh supplied by and National Psychological Corporation, Agra, was employed to evaluate Stress of the subjects.

The (SPSSI) Questionnaire was selected because it is an objective test and employs' simple means based upon research in psychology. It measures the Stress characteristics of an individual in an
extensive manner and is economical in time. The test was administered strictly in accordance with the prescribed procedures.

All the respondents were called into a class room when they were not busy and had enough time to answer the questionnaires. The scholar motivated the respondents by promising to send relevant informations and conclusions of study to each of them. It was assured to them that their responses would be kept confidential and would not be used for any other purpose than the present research study and therefore they could give honest responses without any sense of fear or apprehension.

After that, one questionnaire along with an answer sheet was given to each subject. Subject read the same very carefully one by one and out of three given response options of each event, namely, “seldom”, “sometimes”, and “frequently”, put a tick mark (✓) on cell ( ) below that option which was most suited in his case. The event of the item which was not applicable left unanswered.5

**Scoring:**

Every item marked as ‘Seldom’ by the tester is given a score of 1, marked as ‘Sometimes’ is given a score of 2 and marked as

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'Frequently' a score of 3. Unmarked items are given a score of Zero. Subsequently, scores earned by the tester on every marked item were added together to yield a total score. Higher was the score, the higher was the magnitude of stress. The maximum score on SPSSI was 105.

Anxiety

Test Anxiety Scale TAS questionnaire developed by Dr. V.P. Sharma, supplied by National Psychological Corporation, Agra, was employed to evaluate Anxiety of the subjects.

The TAS questionnaire was selected because it is an objective test and employs simple means based upon research in psychology. It measures the anxiety characteristics of an individual in an extensive manner and is economical in time. The test was administered strictly in accordance with the prescribed procedures.

All this respondents were called into a class room when they were not busy and had enough time to answer the questionnaire. The scholar motivated the respondents by promising to send relevant information and conclusions of study to each of them. After that, one questionnaire along with an answer sheet was given to each subject. It was emphasized that there was no right and wrong responses to the situations. It took 30 minutes to complete this self-administered scale.
It was directed to select only one of the five alternative reactions in each situation which was believed to be frequently operative in student’s cases. A tick mark is put against each of such reactions of student’s choice for every item in the appropriate Box. Further it was directed not to omit any item.

In this case also the scholar motivated the respondents by promising to send relevant informations and conclusions of study to each of them. It was assured to them that their responses would be kept confidential and would not be used for any other purpose than the present research study and therefore they could give honest responses without any sense of fear or apprehension and the result of this test will not have any relation with their academic proficiency.

**Scoring:**

Out of five alternative answers of each situation the first alternative weights assigned-1 mark, second alternative weights assigned-2 marks, third alternative weights assigned-3 marks, fourth alternative weights assigned-4 marks and fifth alternative weights assigned-5 marks.⁶

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Subsequently, scores earned by the tester on every marked item was added together to yield a total score. Higher was the score, the higher was the magnitude of anxiety. The maximum score on TAS was 99.5.

**Personality**

The Cattell's 16 Personality Factors Questionnaire (Form-A) developed by Raymond B. Cattell and Herber W. Eber was supplied by psychocentre, New Delhi that was employed to evaluate personality characteristics of the subjects. The 16 P.F. Questionnaire was selected because it is an objective test and employs simple means based upon research in psychology. It measures the personality characteristics of an individual in an extensive manner and is economical in time. The test was administered strictly in accordance with the prescribed procedures.\(^7\)

All the respondents were called into a class room when they were not busy and had enough time to answer the questionnaire. The scholar motivated the respondents by promising to send relevant information and conclusions of study to each of them. It was assured to them that their responses would be kept confidential and would not be

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used for any other purpose than the present research study, and therefore they could give honest responses without any sense of fear or apprehension. After that, one questionnaire along with an answer sheet was given to the respondents by promising to send relevant information and conclusion of study to each of them. It was assured to them that their responses would be kept confidential and would not be used for any other purpose than the present research study, and therefore they could give honest responses without any sense of fear or apprehension. After that, one questionnaire along with an answer sheet was given to each subject. Following the instructions they answered all the 187 statements.

**Scoring of the Questionnaire:**

The scoring of completed answer-sheets was done according to the method described in the manual.\(^8\) Two card board stands scoring keys were used, one covered factors (traits) A, C, F, H, L, N, Q1 and Q3 and other factors B, E, G, I, N, Q, Q2 and Q4.

Sixteen Personality trait factors:

A (Reserved v/s outgoing)

B (Less Intelligent v/s More Intelligent)

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C (Affected by feeling v/s Emotionally stable)
E (Humble v/s Aggressive)
F (Desurgency v/s Surgency)
G (Weaker super ego strength v/s Stronger super ego strength)
H (Shy v/s Venturesome)
I (Tough minded v/s Tender minded)
L (Trusting v/s Suspicious)
M (Practical v/s Imaginative)
N (Forth right v/s Shrewd)
O (Placid v/s Apprehensive)
Q1 (Conservative v/s Experimenting)
Q2 (Group dependent v/s Self sufficient)
Q3 (Undisciplined self-conflict v/s High self-concept control)
Q4 (Low ergic tension v/s High ergic tension)

Before using the scoring stencils, each answer sheet was checked to ensure that there were no odd, unscramble responses. After checking stencil it was made to fit over the answer sheet and the scores visible through holes were counted as indicated by numbers printed adjacent to the hole. These scores were summed up and total score was entered in the space indicated by the arrow on the stencil for each factor.
The raw score were converted into 'stens' with the help of norms in the test-manual.

**Method to Plot profiles:**

The Red, Black, Green and Blue colors were used to represent group-A (Aerobic training), group-B (hatha yoga training), group-C (combination of hatha yoga and aerobic training) and group-D (control group) respectively. While circle symbol (o), star symbol (•) and star around the circle symbol (Φ) were used to represent the pre, post and adjusted post-test phases respectively.

*Physical Fitness*

AAHPERD Youth Fitness Test was administered to the subjects, strictly in accordance to the instructions given in the manual.9

**Reliability of the Data**

The reliability of the data was ensured by establishing the tester competency, subject reliability and instrument reliability.

**Tester competency**

To ensure that the investigator was well-versed with the techniques of conducting the tests and taking the measurements, the investigator had a number of practice sessions in testing procedure.

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under the guidance of the supervisor. All possible assistance of the Lecturers in physical education, Ph.D scholar, medical officer and athletic coaches who were also well acquainted with the tests and measurements were received.

Tester reliability in conducting tests on physiological variables (resting breathing frequency, resting Heart rate, resting systolic and diastolic blood pressure and Vital capacity) and physical fitness (AAHPERD Youth Fitness Test) were established by test-retest process. Thereby consistencies of results were obtained by the scholar out of the scores obtained by the expert on randomly selected sample of 35 subjects. The co-efficient are presented in Table 1 and 2.
Table 1

CO-EFFICIENT OF CORRELATION FOR TESTER RELIABILITY IN PHYSIOLOGICAL VARIABLES

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Physiological variables</th>
<th>Co-Efficient of correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Resting breathing Frequency</td>
<td>0.9094</td>
</tr>
<tr>
<td>2</td>
<td>Resting Heart rate</td>
<td>0.9356</td>
</tr>
<tr>
<td>3</td>
<td>Resting blood pressure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Resting Systolic blood pressure</td>
<td>0.9198</td>
</tr>
<tr>
<td></td>
<td>b) Resting Diastolic blood Pressure</td>
<td>0.9356</td>
</tr>
<tr>
<td>4</td>
<td>Vital Capacity</td>
<td>0.9529</td>
</tr>
</tbody>
</table>

Table 2

CO-EFFICIENT OF CORRELATION FOR TESTER RELIABILITY IN AAHPERD YOUTH FITNESS TEST

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Physical fitness Components</th>
<th>Co-Efficient of correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50 Yard dash</td>
<td>0.9497</td>
</tr>
<tr>
<td>2</td>
<td>Standing Broad Jump</td>
<td>0.9321</td>
</tr>
<tr>
<td>3</td>
<td>Bent Knee Sit up</td>
<td>0.912</td>
</tr>
<tr>
<td>4</td>
<td>Shuttle run</td>
<td>0.9347</td>
</tr>
<tr>
<td>5</td>
<td>Pull up</td>
<td>0.9501</td>
</tr>
<tr>
<td>6</td>
<td>600 yard Run walk</td>
<td>0.9111</td>
</tr>
</tbody>
</table>

Subject Reliability
Physiological variables namely resting breathing frequency, resting heart rate, resting systolic blood pressure, resting diastolic blood pressure and vital capacity were conducted on two consecutive days, in the case of 30 percent of subjects, who were selected at random, so that test-retest co-efficient of correlation might be computed to establish reliability of the data. The obtained r’s are given in Table 3.

Table 3
TEST-RETEST RELAIBILITY CO-EFFICIENT OF SUBJECTS IN PHYSIOLOGICAL VARIABLES

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Physiological variables</th>
<th>Co-Efficient of correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Resting breathing frequency</td>
<td>0.9464</td>
</tr>
<tr>
<td>2</td>
<td>Resting Heart rate</td>
<td>0.9094</td>
</tr>
<tr>
<td>3</td>
<td>Resting blood pressure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Resting Systolic blood pressure</td>
<td>0.9198</td>
</tr>
<tr>
<td></td>
<td>b) Resting diastolic blood Pressure</td>
<td>0.9576</td>
</tr>
<tr>
<td>4</td>
<td>Vital Capacity</td>
<td>0.9529</td>
</tr>
</tbody>
</table>
AAHPERD Youth Fitness Test was conducted on two consecutive days. In the case of 30 percent of subjects, who were selected at random, so that test-retest co-efficient of correlation might be computed to establish reliability of the data. The obtained r’s are given in Table 4.

**TABLE 4**

**TEST-RETEST RELAIBILITY CO-EFFICIENT OF SUBJECTS IN AAHPERD YOUTH FITNESS TEST**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>AAHPERD Youth Fitness Test</th>
<th>Co-Efficient of correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50 Yard dash</td>
<td>0.9597</td>
</tr>
<tr>
<td>2</td>
<td>Standing Broad Jump</td>
<td>0.9321</td>
</tr>
<tr>
<td>3</td>
<td>Bent Knee Sit up</td>
<td>0.9223</td>
</tr>
<tr>
<td>4</td>
<td>Shuttle run</td>
<td>0.9317</td>
</tr>
<tr>
<td>5</td>
<td>Pull up</td>
<td>0.9551</td>
</tr>
<tr>
<td>6</td>
<td>600 yard Run walk</td>
<td>0.9184</td>
</tr>
</tbody>
</table>

**Instrument Reliability**

The stop watches used for measuring performance of the subjects in 50 yard dash, 600 yard run and walk, and shuttle run test were all calibrated and approved for use by the Physiology Laboratory Lakshmibai National University of Physical education, Gwalior,

The steel tape used to measure the performance of the subjects in standing broad jump was non-elastic and flexible, which was calibrated and approved for use by the Physiology Laboratory Lakshmibai National University of Physical education, Gwalior, Madhya Pradesh, India.

The sphygmomanometer, Stethoscope and wet spirometer were used for testing blood pressure and vital capacity. It was calibrated and approved for use by the Research Laboratory of the Lakshmibai National University of Physical education, Gwalior, Madhya Pradesh, India.

**Administration of Training programme**

Having selection of the subject, they were divided into four equal groups (i.e., A, B, C & D) namely Aerobic Training group, hatha yoga training group and combination hatha yoga and aerobic training group and one Control group respectively. The experimental groups namely A, B and C) were subjected to a progressive Aerobic Training, Hatha yoga training and Combination of Hatha yoga and aerobic training programmes respectively prepared by the investigator. This
training programme was prepared by consulting with the supervisor of this thesis, Research scholars, Lecturers, experts in Physical Education and on the basis of scholar's own experience. A ten weeks aerobic training, hatha yoga training and combination Hatha yoga and aerobic training programme for three days in a week i.e., on Monday, Wednesday & Friday were conducted in this study. The training programme was administered in the morning session of the day. The control group was asked to continue their regular programme as usual.
HATHA YOGA TRAINING PROGRAMME

Preparatory Phase:

Savasana

a) Relaxation activity at lower extremities.
   1. Asana:
      f. Salvasana. g. Sarvangasana. h. Yogamudra.
      i. Ardhamasyendrasana. j. Chakrasana (side)

b) Relaxation activity at upper extremities.
   2. Kriya:
      a. Kapalbhati.

b) Relaxation activity at head to viscera.
   3. Pranayama:
      a. Ujjay b. Suryabhedane

4. Mudra:
   a. Maha Mudra b. Maha Bandha

5. "OM" kara
   a. "OM" kara recitation
# Hatha Yoga Training Schedule

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Preparatory Phase (Savasana)</th>
<th>Asana</th>
<th>Kriya</th>
<th>Pranayama</th>
<th>Mudra</th>
<th>'OM' kara</th>
<th>Intensity</th>
<th>Frequency</th>
<th>Density</th>
<th>Duration</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st &amp; 2nd</td>
<td>(Relaxation lower, upper extremities &amp; head to visceral)</td>
<td>10 items</td>
<td>1 item</td>
<td>2 items</td>
<td>2 items</td>
<td>1 item</td>
<td>Low</td>
<td>Two</td>
<td>(16 items in 9.05 min)</td>
<td>18.10 min</td>
<td>26.10 min</td>
</tr>
<tr>
<td>3rd &amp; 4th</td>
<td>5 min</td>
<td>Low</td>
<td></td>
<td>Two</td>
<td></td>
<td></td>
<td>Low</td>
<td>Three</td>
<td></td>
<td>6 min</td>
<td>27.15 min</td>
</tr>
<tr>
<td>5th &amp; 6th</td>
<td>5 min</td>
<td>Low</td>
<td></td>
<td>Three</td>
<td></td>
<td></td>
<td>Low</td>
<td>Four</td>
<td></td>
<td>9 min</td>
<td>36.20 min</td>
</tr>
<tr>
<td>7th &amp; 8th</td>
<td>5 min</td>
<td>Low</td>
<td></td>
<td>Four</td>
<td></td>
<td></td>
<td>Low</td>
<td>Five</td>
<td></td>
<td>12 min</td>
<td>45.25 min</td>
</tr>
<tr>
<td>9th &amp; 10th</td>
<td>5 min</td>
<td>Low</td>
<td></td>
<td>Six</td>
<td></td>
<td></td>
<td>Low</td>
<td>Six</td>
<td></td>
<td>15 min</td>
<td>54.30 min</td>
</tr>
</tbody>
</table>
In the Initial stage i.e. 1st and 2nd week of hatha yoga training programme 5 minutes time was devoted for preparatory phase (Savasana) and 18.10 minutes time was devoted for two sets of 16 hatha yoga training items. (For each 16 items of hatha yoga training 16 second time was devoted while 15 sec time was devoted for each 15 active rest period in between each two items of hatha yoga training and thus in the 1st and 2nd weeks in total 9.05 minutes time was devoted per set of for hatha yoga training). Further in between each set of hatha yoga training 3 three) minutes time was devoted for active rest. Thus in 1st and 2nd weeks total 26.10 minutes (5 min+18.10 min+3 min) time was devoted.

Further, in each after two weeks although 5 minutes time was kept fixed for preparatory phase (Savasana), but the training duration of hatha yoga was enhanced each after two weeks as because the same set of hatha yoga training items was repeated by one set more in each after two weeks. Further in addition to the enhancement of above time for executing one set more of hatha yoga training per two weeks, 3 minutes more time was also devoted for each active rest period (density time) in between the sets of hatha yoga training programme and thus on the 9th and 10th weeks the total duration of time of hatha yoga training programme arrived at 74.30 minutes.
AEROBIC TRAINING ITEMS

Warming Up Session
* Breathing
* Stretching
* Joint Mobilizing
* Twisting
* Walking
* Slow Marching

AEROBIC WORKOUT SESSION

On the Spot Movement
* Rhythmic Toe and Heel Action
* Rotatory & stretch Movement:
  Head
  Shoulder
  Arms
  Hips
  Legs
  Fast Marching
  On the Spot
  Skipping
  Bending
  Half Squats

Dynamic Movement
* Stepping
  Forward
  Backward
  Diagonal
  Marching
  Forward
  Backward
  Diagonal
  Hopping
  Dancing
  Movements

Movement of Sitting
  and lying position
  * Abdominal Exercise
  * Lower & Upper Back Exercise
  * Exercises at Lying on the Sides
  * Exercises at Elbow Support Position

Cooling Down Session
* Breathing
* Stretching
* Relaxation
# AEROBIC TRAINING SCHEDULE

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Preparatory Phase</th>
<th>AEROBIC EXERCISES</th>
<th>Intensity</th>
<th>Frequency</th>
<th>Density</th>
<th>Duration of Work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Warming-up)</td>
<td>On the spot</td>
<td>Dynamic</td>
<td>Movement of sitting and lying position</td>
<td>Total=14 items in 9.10 min</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>movement=6 items</td>
<td>Movement=4 items</td>
<td>and lying position=4 items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st&amp;2nd</td>
<td>5 min</td>
<td>Optimum</td>
<td>Two</td>
<td>3 min</td>
<td>18.2 min</td>
<td>26.20 min</td>
</tr>
<tr>
<td>3rd&amp;4th</td>
<td>5 min</td>
<td>Optimum</td>
<td>Three</td>
<td>6 min</td>
<td>27.3 min</td>
<td>38.30 min</td>
</tr>
<tr>
<td>5th&amp;6th</td>
<td>5 min</td>
<td>Optimum</td>
<td>Four</td>
<td>9 min</td>
<td>36.4 min</td>
<td>40.40 min</td>
</tr>
<tr>
<td>7th&amp;8th</td>
<td>5 min</td>
<td>Optimum</td>
<td>Five</td>
<td>12 min</td>
<td>45.5 min</td>
<td>62.50 min</td>
</tr>
<tr>
<td>9th&amp;10th</td>
<td>5 min</td>
<td>Optimum</td>
<td>Six</td>
<td>15 min</td>
<td>55 min</td>
<td>75.00 min</td>
</tr>
</tbody>
</table>
In the Initial stage i.e. 1st and 2nd week of aerobic training programme 5 minutes time was devoted for preparatory phase (Warming up) and 18.20 minutes time was devoted for two sets of 14 aerobic training items. (For each 14 items of aerobic exercise 10 sec, time was devoted while 13 active rest period in between each two items of aerobic exercise and thus in the 1st and 2nd weeks in total 9.10 minutes time was devoted for aerobic training.) Further in between each set of hatha yoga training 3 (three) minutes time was devoted for active rest. Thus in 1st and 2nd weeks all total 26.20 minutes (5 min + 18.20 min + 3 min) time was devoted.

Further, in each after two weeks although 5 minutes time was kept fixed for preparatory phase (Warming up), but the training duration of aerobic exercises was enhanced each after two weeks as because the same set of aerobic training items was repeated by one set more in each after two weeks. Further in addition to the enhancement of above time for executing one set more of aerobic training per two weeks, 3 minutes time was also devoted for each active rest period (density time) in between the sets of aerobic training programme and thus on the 9th and 10th weeks the total duration of time of aerobic training programme arrived at 75.00 minutes.
### Combination of Hatha yoga and Aerobic training programme

**PREPARATORY PHASE**

<table>
<thead>
<tr>
<th>Hatha yoga</th>
<th>Aerobic Training</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preparatory Phase:</strong></td>
<td><strong>Preparatory Phase:</strong></td>
</tr>
<tr>
<td>Savasana</td>
<td>Warming Up</td>
</tr>
<tr>
<td>a) Relaxation activity at lower extremities.</td>
<td><em>Breathing</em></td>
</tr>
<tr>
<td>b) Relaxation activity at upper extremities.</td>
<td><em>Joint Mobilizing</em></td>
</tr>
<tr>
<td>c) Relaxation activity at head to viscera</td>
<td><em>Slow Marching</em></td>
</tr>
</tbody>
</table>

**TRAINING PHASE**

<table>
<thead>
<tr>
<th>Hatha yoga Training items:</th>
<th>Aerobic Training items:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asana:</strong></td>
<td>(Ten items)</td>
</tr>
<tr>
<td>a. Pavanamuktasana.</td>
<td>(Ten items)</td>
</tr>
<tr>
<td>b. Matsyasana.</td>
<td><strong>On the Spot Movement</strong></td>
</tr>
<tr>
<td>c. Halasana.</td>
<td><strong>Dynamic Movement</strong></td>
</tr>
<tr>
<td>d. Sarvangasana.</td>
<td><em>Rhythmic Toe and Heel Action</em></td>
</tr>
<tr>
<td>e. Yogamudra.</td>
<td><em>Stepping</em></td>
</tr>
<tr>
<td>f. Ardhamasyendrasana.</td>
<td>Forward</td>
</tr>
<tr>
<td>Kriya:</td>
<td>Backward</td>
</tr>
<tr>
<td>a. Kapalbhati.</td>
<td>Diagonal</td>
</tr>
<tr>
<td>Pranayama:</td>
<td><em>Dancing</em></td>
</tr>
<tr>
<td>a. Ujjay</td>
<td>Movements</td>
</tr>
<tr>
<td>Mudra:</td>
<td><strong>Skipping</strong></td>
</tr>
<tr>
<td>a. Maha Mudra</td>
<td><strong>Colling Down Session</strong></td>
</tr>
<tr>
<td>“OM” kara recitation</td>
<td><em>Stretching</em> <em>Relaxation</em></td>
</tr>
</tbody>
</table>
# Combination of Hatha yoga and Aerobic training schedule

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Preparatory Phase (Savasana)</th>
<th>Yoga Exercises</th>
<th>Aerobic Exercises</th>
<th>Movement of Sitting and Lying Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCHEDULE</td>
<td></td>
<td>Asanas</td>
<td>Kriya</td>
<td>Pranayama</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 (min)</td>
<td></td>
<td>Asana: a. Pranamuktesana.</td>
<td>6 items</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>b. Matsyasana.</td>
<td>1 item</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Halasana.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. Sarvangasana.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. Yogamudra.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>f. Ardhamukheerasana.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mudra: a. Maha Mudra</td>
<td>&quot;OM&quot; kara recitation</td>
<td></td>
</tr>
</tbody>
</table>

## Yoga Exercises
- Asanas
- Kriya
- Pranayama
- Mudra
- OM kara

## Aerobic Exercises
- Preparatory Phase
- Aerobic Exercises
- On the spot movement
- Dynamic movement
- Movement of Sitting and Lying Position

## Intensity
- One
- Two
- Three
- Four
- Five

## Frequency
- Low

## Density
- Duration

## Overall
- Duration

### Intensity Frequency Density Duration Total

<table>
<thead>
<tr>
<th>Weeks</th>
<th>(Repe-</th>
<th>(Active rest</th>
<th>Duration</th>
<th>Total</th>
<th>Intensity</th>
<th>Frequency</th>
<th>Density</th>
<th>Duration</th>
<th>Total</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st &amp; 2nd</td>
<td>(min)</td>
<td>(min)</td>
<td>(min)</td>
<td>(min)</td>
<td>(min)</td>
<td>(min)</td>
<td>(min)</td>
<td>(min)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>LOW</td>
<td>One</td>
<td>5</td>
<td>8</td>
<td>3</td>
<td>3</td>
<td>Low</td>
<td>One</td>
<td>5</td>
<td>8.00</td>
</tr>
<tr>
<td>3rd &amp; 4th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>LOW</td>
<td>Two</td>
<td>10</td>
<td>15</td>
<td>3</td>
<td>3</td>
<td>Low</td>
<td>Two</td>
<td>10</td>
<td>15.00</td>
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<tr>
<td>5th &amp; 6th</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>LOW</td>
<td>Three</td>
<td>15</td>
<td>22</td>
<td>3</td>
<td>3</td>
<td>Low</td>
<td>Three</td>
<td>15</td>
<td>22.00</td>
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<tr>
<td>7th &amp; 8th</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>LOW</td>
<td>Four</td>
<td>20</td>
<td>29.30</td>
<td>3</td>
<td>3</td>
<td>Low</td>
<td>Four</td>
<td>20</td>
<td>29.30</td>
</tr>
<tr>
<td>9th &amp; 10th</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>LOW</td>
<td>Five</td>
<td>25</td>
<td>36</td>
<td>3</td>
<td>3</td>
<td>Low</td>
<td>Five</td>
<td>25</td>
<td>36.00</td>
</tr>
</tbody>
</table>
In combination of hatha yoga and aerobic training programme, (under the same training session) in the first phase, the hatha yoga and in the second phase the aerobic training were exercised as per the training items and training schedule of the study.

In the Initial stage i.e. 1\textsuperscript{st} and 2\textsuperscript{nd} week, in the preparatory period of first phase of combination training (hatha yoga) three minutes (3) time was devoted for sovasona. Farther 5 minutes time was devoted to exercise 10 hatha yoga training items each twenty one (21) seconds time was devoted to exercise ten items of hatha yoga training, while each ten seconds time was spend for nine active rest period in between the ten items of hatha yoga training, and there by in total, five minutes time was devoted for exercising ten items of hatha yoga exercises). However to complete total hatha yoga training programme including sovasana, all-total eight (8) minutes (3 minutes+ 5 minutes) time was devoted.

Similarly in aerobic training programme also in the initial stage three minuets (3) time was devoted for warming up. Further 5minutes time was devoted to exercise 10 aerobic training items. (To exercise ten items of aerobics exercise each twenty one (21) seconds time was devoted, while each ten second time was spent for nine active rest period in between the items of aerobic exercises and there by five
minutes time was devoted for exercising ten items of aerobic exercises).

However to complete the total aerobic training programme including warming up, eight (8) minutes (3 minutes + 5 minutes) time was devoted.

Further in between hatha yoga and aerobic training programme, three minutes time was devoted as interval period. There by in the initial stage i.e. 1st and 2nd week in order to complete the entire combined training programme of hatha yoga training and aerobic training including preparatory phase, and interval period all total nineteen minutes (8 min+3 min + 8 min =19 min) time was devoted.

Further in each after two weeks although each three minutes time was kept fixed for preparatory phase in hatha yoga (savasona) as well as aerobic training programmes (warming up).But duration for exercising hatha yoga items as well as aerobic exercises was enhanced by each five minutes time more in each after two weeks, as because the same set of hatha yoga exercise as well as aerobic exercise repeated once more in each after two weeks. Further in addition to the enhancement of above time for repetition of hatha yoga items as well as repetition of aerobics exercises once more in each after two weeks.
another each two minutes (2 minutes) time were also devoted as active rest period (density period) and thus in 9th to 10th weeks of training programmes to complete the hatha yoga training as well as the aerobic training programmes, each 36 minutes time was devoted for each training and thereby, to complete entire combined training programme (hatha yoga training as well as aerobics training) including interval time (3 min) in between to aforesaid trainings, all total 75 minutes (36 min + 3 min + 36 min) time was devoted.

**Design of the Study**

To compare the effect of Aerobic training, Hatha yoga training, and combination of both Hatha yoga and Aerobic training on selected Physiological variables, namely- resting breathing frequency, resting pulse rate, resting blood pressure (Systolic & Diastolic) and Vital capacity, on selected Psychological variables, namely-Stress, Anxiety, Personality and on the Physical fitness of the college male students, the random group design was adopted.

**Statistical Procedure**

1. To establish the reliability of the data the Pearson’s product moment correlation method was used.
2. In order to investigate the comparative effect of each training method i.e Therefore Aerobic training, Hatha yoga training, and combination of Hatha yoga and aerobic training, on selected Physiological variables (resting breathing frequency, resting heart rate, resting systolic blood pressure, resting diastolic blood pressure and vital capacity), psychological variables (stress, anxiety and personality) and physical fitness among three experimental groups and one control group of the college male students undertaken on this study, the analysis of co-variance statistics was applied.

3. In case of existence of significant differences is found, the post-hoc test was applied in order to investigate the existence significant differences if any, between the groups of three experimental groups namely aerobic training, hatha yoga training and combination of Hatha yoga and aerobic training and one control group of college male students.

**Level of Significance**

To compare the mean difference among the subjects, due to the effect of Aerobic training, Hatha yoga training, and combination of aerobic training and hatha yoga training on selected physiological variables (breathing frequency, resting heart rate, resting systolic blood
pressure, resting diastolic blood pressure and vital capacity), psychological variables (stress, anxiety and personality) and physical fitness undertaken in this study of college male student, the significant level was set at 0.05 level of confidence.