Chapter - III

PROCEDURE

In this chapter the selection of subjects, selection of variables, criterion measures, reliability of data, the experimental design, experimental procedure, collection of data, treatment procedure, administration of the tests, measurement procedure and the statistical technique employed have been presented.

Selection of Subjects

Sixty Judokas studying at various standards at Lakshmibai National Institute of Physical Education and Jiwaji University, Gwalior voluntarily participated in the study and were selected as the subjects for the study.

The subjects were assigned at random to experimental and control group; each group consisted of thirty students.
The requirements of the study were explained to all the subjects. All the subjects readily agreed to undergo the testing and training programmes.

**Selection of Variables**

On the basis of available literature on Physiological variables and coordinate abilities and their tests; findings of the related research studies and keeping in mind the specific purpose of the study to find out the effect of Transcendental Meditation on selected physiological variables and coordinative abilities, the following variables were selected for the study:

**Coordinative Abilities:**

1. Reaction Ability
2. Orientation Ability
3. Differentiation Ability
4. Balance Ability
5. Rhythmic Ability
Physiological Variables

1. Anaerobic Power
2. Vital Capacity
3. Resting Respiratory Rate
4. Resting Heart Rate
5. Body Composition
   - Total Body Fat Percentage
   - Lean Body Weight

Criterion Measures

Criterion measures for testing the hypothesis were the following:

i) Reaction ability was measured by the Ball Reaction Exercise Test and recorded in centimeters.

ii) The Orientation ability was measured by using Numbered Medicine Ball Run Test and recorded in seconds.
iii) Differentiation ability was assessed by using Backward Medicine Ball Throw Test and recorded in points.

iv) Balance ability was measured by using long Nose Test and recorded in seconds.

v) Rhythm ability was measured by using sprint at given Rhythm Test and recorded in seconds.

vi) Anaerobic powers was calculated in Kg/m/sec. by Sargent Jump Test.

vii) Vital Capacity was measured in liters by dry spirometer.

viii) Resting Respiratory Rate was measured in numbers by seeing the movements of abdomen in single minute.
ix) Resting Heart Rate was measured in numbers, for one minute.

x) Total body fat percentage was calculated by Sloan Weir Nomogram.

Reliability of Data

Data reliability was ensured by establishing the instruments reliability, testing reliability, reliability of tests and subjects reliability.

Instruments Reliability

The instruments used in the study were obtained from standard firms, which cater to the needs of various research laboratories in India and abroad and their calibrations were accepted as accurate enough for the purpose of the study.
Tester Competency

To ensure that the investigator was well versed in the techniques of conducting the test, the investigator had a number of practice sessions in the testing procedure under the guidance of the expert.

Tester competency was also evaluated together by reliability of tests.

Subjects Reliability

The above test-retest coefficient of correlation method also established that subjects reliability was significant at .01 level of confidence, as the same subjects were used under similar conditions by the same tester and no motivational techniques were used nor any training imparted.
The Experimental Design

The random group design was used for the study. Two groups were made of the subjects each comprising of thirty subjects. These subjects participated voluntarily in the study. The subjects who wanted to learn Transcendental Meditation and practiced were kept in the experimental group (N = 30) and other subjects who opted to serve as non meditators were kept in control group (N = 30).

The Experimental Procedure

The study was conducted for a period of eight weeks in the month of August and September. The climatic condition was rainy (humid) and atmospheric temperature was ranging from 25°C to 35°C.

Sixty subjects were assembled in the Judo hall of Lakshmibai National Institute of Physical Education, Gwalior at 5:30 AM for six days per week. Two
groups comprising of 30 subjects each were formed i.e. experimental group and control group.

Each subject of experimental group was ready to learn Transcendental Meditation. Teacher (an authorized expert of Maharishi Mahesh Yogi Vedic Vishvavidyalaya) gave a Performa to each subject of experimental group. All the subject of experimental group filled the Performa after going through the guide lines of Performa i.e. age, sex, occupation, religion and belief etc. Teacher gave a particular mantra separately to all the subject of experimental group.

Thereafter Teacher briefly introduced experimental group with the introductory and preparatory speech than he conducted PUJA (Worship) of Guru Bhramanand Saraswati, father of transcendental meditation technique. Followed by Puja all the subjects of experimental group practiced transcendental medication for 20 minutes starting with a silence of half minute and finishing it with a silence of two minute in Lotus like sitting position with close eyes.
The subjects of control group were asked to sit quietly with eyes closed in Lotus like position.

Collection of Data

The data for Physiological Variables and coordinative abilities was collected twice, that is before the start of study and after the 8 weeks as to record the final performance of the tests.

All the scores were collected on the first day before teaching the meditation to the experimental group and repeated after a period of 8 weeks.

Treatment Procedure

The technique of Transcendental Meditation involves the repetition of a Mantra for 20 minutes each day while the meditators sit in lotus like position with eyes closed. First, the meditator work out the most comfortable position for himself, one which allows the spine to be in an upright position either in lotus like
sitting positions on the floor or in a straight backed chair with feet firmly planted on the ground with eyes closed.

One began with taking few deep and well modulated breath to calm down and then proceed to the subvocal repetitions of the Mantra or specific sound.

ADMINISTRATION OF PHYSIOLOGICAL TESTS

ANAEROBIC POWER

Objective: To measure Anaerobic Power.

Equipments: Measuring tape, Back Board with 0.5 cm. marking and chalk power.
The Lewis Nomogram for determining Anaerobic Power from Jump-Reach score and body weight.
Description: The score of vertical jump was obtained in meters by measuring the difference between a person's reach and the high to which he touched with jump. The body weight was calculated in Kilograms.

Scoring: To obtain a score of anaerobic power, a straightedge was laid across the Lewis Nomogram connecting the scores of the distance of Sargent jump and body weight. Where the straightedge intersected the middle scale was the anaerobic power.¹

RESTING HEART RATE

Objective: To measure the Resting heart rate.

Equipment: Stop Watch.

Description: The resting heart rate of each of the subject was recorded between 6.00 AM and 8.00 AM. Before recording the resting heart rate, the subjects were

instructed to remain lying on their bed. To record the heart rate, the pulse rate was recorded by palpation at the radial artery per minute.

**Score:** The score was expressed in terms of number of pulse beats per minute.

**RESTING RESPIRATORY RATE**

**Objective:** To measure the Resting respiratory rate.

**Equipments:** Stop Watch.

**Description:** The Resting respiratory rate of each subject was recorded between 6.00 AM to 8.00 AM. Before recording the resting respiratory rate, the subject was instructed to remain lying on their beds in supine lying position. The tester then recorded rate of respiration in unit counts per minute by carefully watching the movements of subjects abdomen.
Scoring: The total number of respiratory movements per minute were finally recorded.

VITAL CAPACITY

Objective: To measure the Vital Capacity.

Equipments: Dry Spirometer, Nose Clip.

Description: The spirometer was brought in to zero position. The subject performed maximum inspiration and after clipping the nose, the air was blown out as intensely as possible in the mouth piece.

Scoring: The amount of expired air was read directly from the calibrated scale and that was the score of vital capacity and was recorded in litres.²

TOTAL BODY FAT PERCENTAGE

Objective: To measure the Total Body Fat Percentage.

Equipments: Skinfold Calliper.

Description: For calculating total body fat percentage of the subjects, Slawn Weir Nomogram technique was used. In this technique two sites (thigh and subscapular) skin thickness was used.

Scoring: To obtain a score of total body fat percentage, a straightedge was laid across the nomogram connecting the scores of thigh and subscapular skinfolds, where the straightedge intersected the middle scale was the total body fat percentage.\(^3\)

LEAN BODY WEIGHT (Fat Free Weight)

The lean body weight was calculated by subtracting the fat weight of the subjects from their total body weight.\(^4\)

\[ \text{Lean Body Weight} = \text{Total Body Weight} - \text{Fat Weight} \]

\(^3\)Fox, Bowers and Foss, *The Physiological Basis of Physical Education and Athletics*, pp. 566.

Sloen-Weir Nomogram for prediction of total body fat percentage from skinfolds measurement (Sub Scapular and Thigh)
Administration of Co-ordinative Abilities Test

The necessary data was collected by administering co-ordinative abilities tests as suggested by Peter Hirtz.⁵

The necessary work was done before the start of the test. All the tests were administered and explained to the subjects by the scholar.

Ball Reaction Exercise Test

Objective:  To measure the Reaction Ability.

Equipments:

1) Two wooden planks, each of 4 m. length
2) One inflated volleyball
3) A supporting stand
3) Pencil, Papers and Clipboard

⁵ Peter Hirtz., Koordinative Fahigkeiten in Schul Sport, p.7.
REACTION ABILITY TEST

Fig. 3
Description: Two wooden planks of 4 mt in length each were kept inclined by a supporting stand having a height of one meter and twenty centimeters. So that it could enable a volleyball to roll freely from a height of 1.20 mt. The lower ends of the wooden planks were kept at a distance of 1.5 mt. away from the starting line, outersides of one of the planks was graduated in centimeters.

A volleyball was held by the tester at the top of the planks. The subjects were asked to stand behind the starting line, facing opposite to the planks on claping, the subject took a turn and ran towards the planks and stopped the ball with both the hands which was dropped on the signal. Each subject was given a practice trial before actual commencement of the test.

Instructions:

1) The ball should be stopped with both the hands.

2) The ball should not be pushed upwards while stopping.
Scoring:

The score was the distance measured in centimeters from the top of the planks to a point where the subjects stopped the ball. Only two trials were given and the best one was recorded as the score.

**Numbered Medicine Ball Run Test**

**Objective:** To determine Orientation Ability of the subjects.

**Equipments:**

1) Five medicine balls each weighing 3 kg.
2) One medicine ball weighing 4 kg.
3) Stop Watch
4) Five metallic numbered plates
5) Clapper
6) Pencil, Papers and Clipboard
Numbered Medicine Ball Run Test

Orientation Ability

Fig. 4
**Description:** All the medicine balls weighing 3 kg. were arranged on an even ground in a semi circle. The sixth medicine ball weighting 4 kg. was kept 3 m. away from these medicine balls. Behind all the medicine balls of 3 kg., metallic number plates of 1 square foot size were kept from 1 to 5. Before the start of the test, the subjects were asked to stand behind the sixth medicine ball facing towards the opposite direction. On signal, the subject turned and ran towards the ball, number called by the tester and touched the medicine ball and run back to touch the sixth medicine ball, immediately another number was called, similarly a total of three times the number was called by the tester and the subject performed accordingly. Before the actual test was administered, one practice trial was given to all the subjects.

**Scoring:**

The time taken to complete the course was noted in seconds. Two trials were given to each subject and the best one was recorded as score.
**Backward Medicine Ball Throw Test**

**Objective:** To assess the Differentiation Ability of the Subjects.

**Equipments:**

1) A gymnastic mat, size 3’ x 6’
2) One medicine ball weighting 2 kg.
3) Five medicine balls weighing 1 kg. each
4) Pencil, papers and clipboard

**Description:** A gymnastic mat was kept 2 mts. away from the starting line. A circle of 40 cm. radius was drawn in the middle of the mat and a medicine ball of 2 kg. was kept at the center of the circle. The subjects were asked to stand behind the starting line facing the opposite direction. They were asked to throw five medicine balls (1 kg. each) over the head to hit the 2 kg. ball kept on the mat, one after another by using both the hands. One practice trial was given to all the subjects.
BACKWARD MEDICINE BALL THROW TEST

GYMNASTIC MAT

CIRCLE

MEDICINE BALL 2 Kg.

2M

STARTING LINE

DIFFERENTIAL ABILITY
Instructions:

1) Only overhead throw was permitted.

2) The students were not allowed to look back

Scoring:

1) Medicine ball touching the mat - 1 point

2) Medicine ball touching the circle line - 2 points

3) Medicine ball touching inside the circle - 3 points

4) Medicine ball touching the 2 kg. Medicine Ball- 4 points.

Points were decided considering the first pitch of the ball. The score of the individual was the total points scored in all the five throws.
**Long Nose Test**

**Objective:** To determine the Balance ability of the subjects.

**Equipments:**

I) Balancing Beam

II) One Medicine Ball weighing 2 Kgs

III) One Medicine Ball weighing 4 kgs

IV) Stop Watch

V) Pencil, Paper and Clipboard

**Description:** A balancing beam of standard size was kept on the floor one and half meters away from the starting line. The subjects were asked to stand behind the starting line with one kilogram medicine ball in his strong hand fully stretched forward and the other hand holding the opposite ear lobe. On clapping the subject moved over the balancing beam towards the 2 Kg. medicine ball which was kept at the other end of the beam push down the medicine ball only by foot and would move back to the starting line without loosing the balance over the beam.
LONG NOSE TEST

BALANCING ABILITY TEST

FIG. 6
Instructions:

I) The arm with which the ball is carried should be kept straight.

II) The medicine ball kept on the balancing beam should be rolled down with either foot.

Scoring: Only one chance was given to each subject. The time taken to complete the course was the score. At the same time, the subject who failed to complete the task without loosing balance, were not given any further trial and no score was awarded.

**Sprint at the Given Rhythm Test**

Objective: To determine the Rhythm Ability of the subjects.

Equipments:

I) Eleven gymnastic hoops each 1 mt. in diameter

II) One stop watch

III) One measuring tape
SPRINT AT GIVEN RHYTHM

RHYTHM ABILITY

FIG. 7
**Description:** The subject had to run a distance of 30 mt. with maximum sprinting speed marked between two lines. The sprinting time of the subject was taken by stop watch. In the second attempt the subject had to run at a particular rhythm with maximum speed through eleven hoops which were arranged systematically. Three hoops were kept in a sequence against to each other at a distance of 5 m. away from the starting line. Similarly three hoops were kept at a distance of 5m. from the finishing line. Five more hoops were kept in a sequence in the middle of the running distance. The subject had to run through those hoops stepping in between each hoop. The scholar explained the test along with one demonstration and each subject was given one trial run.

**Scoring:** The difference between the timing of first and second attempt was taken as the score.
Statistical Technique employed for Analysis of Data

To determine whether the experimental treatment was effective in bringing about a significant change in various Co-ordinative abilities and Physiological variables of the Experimental Group in Contrast to the Control group, an analysis of co-variance technique was employed.

To determine whether some significant difference between the initial and final scores for the experimental and control group existed, paired ‘t’ test was administered.

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