Chapter 3

Methodology of the Study

This chapter gives the whole procedure of the study in detail as well as the tools used for this study, their reliability and validity. This chapter also deals with the proper method of the study, which is experimental in nature, based on the objectives of the study and as per the formulated hypotheses. As per the objectives of the study, the researcher had to plan the entire process of research work in terms of research design suited to the present study. To accomplish the purpose of the study, the design has been systematically presented and exhibited in this chapter under the following headings:

Design of the study
Population and Sample
Variables of the study
Data Collection Tools
Statistical Methods
Procedure of the study

3.1 Design of the study

Design of the study is the blueprint of the procedures that enable the researcher to test hypothesis by reaching valid conclusions about relationships between independent and dependent variables. Selection of a particular design is based on the purpose of the experiment, the type of variables to be manipulated and the conditions or limiting factors under which it is conducted. The design deals with such practical problems as how subjects are to be assigned to experimental
and control groups, the way variables are to be manipulated and controlled, the way extraneous variables are to be controlled, how observations are to be made and the types of statistical analysis to be employed in interpreting data relationships. The adequacy of experimental designs is judged by the degree to which they eliminate or minimize threats to experimental validity.

Present study was experimental in nature. (Thomas, Nelson, & Silverman, 2005) Pre-test post-test true experimental design was used to identify the effect of the training on the swimming performance of the subjects. The researcher has chosen a parallel group design for conducting experiment in the present study. This study consists of one control group and the other is an experimental group. The experimental group received selected dependent variable practice training, whereas the control group did not. Pre-test and post-test programs were organized before and after an experimental period of 12 weeks. The design is as follows.

\[
\begin{array}{ccc}
O1 & \longrightarrow & X1 & \longrightarrow & O4 \\
O2 & \longrightarrow & X2 & \longrightarrow & O5 \\
O3 & \longrightarrow & C & \longrightarrow & O6 \\
\end{array}
\]

Figure 3.1 Design of the study

Where,

X is treatment given to experimental group

C is no treatment to control group and O1, O2, O3, O4 are observations
Design of the study

As the nature of the study was experimental, the study was to implement 2 X 3 X 4 factorial designs to identify the effect of Suryanamaskar, Breathing Exercise and Omkar Chanting program on boys only. In this study, there was a pre-test and post-test, three treatment variables namely Suryanamaskar, Breathing Exercise and Omkar Chanting and a Control group, and four age groups including under 10 years, under 12 years, under 14 years and under 16 years.

3.2 Population and Sample

For the present study the population was of 200 competitive boy swimmers of age between 8 to 16 years practising at various swimming pools of Pune city. The swimming pools included S.P. College swimming pool, Tilak swimming pool, Choice Health Club, Harmony, Chaitanya Health Club, Pegasus, and Phule swimming pool. From the population, 120 subjects were randomly selected and distributed in Suryanamaskar training group, breathing exercise and Omkar chanting group and control group. (Table 3.1)
Selection of sample

120 students were pooled as sample from the population by using the convenient sample technique. They were divided into three groups viz, two experimental groups and one control group, consisting of forty students each. Experimental group was given specific selected practice training program of 12 weeks to observe the performance of boy swimmers of age ranging between 8 to 16 years.

3.3 Variables of the study (For experimental study)

Variables are the conditions or characteristics that the experimenter manipulates, controls or observes. After going through the related literature, the following dependent variables were chosen to collect the data at pre-test and post-test and to render training in between.

3.3.1 Independent Variables

In this study, Suryanamaskar, Breathing Exercises and Omkar Chanting were the independent variables.
3.3.2 Dependent Variables

In the present study, dependent variable was the 50 metre freestyle swimming timing.

3.3.3 Confounding Variables

Confounding Variables are those aspects of a study that might influence the dependent variable and whose effects may be confused with the effects of the independent variable. Two types of confounding variables are as follows.

Intervening Variables for this study are swimmer’s feelings and psychological status.

Extraneous Variables for this study are those uncontrolled variables that may have a significant influence on the results of a study. In this study, the extraneous variables are diet of students, parental guidance and the fitness level of the swimmers.

These intervening and extraneous variables were controlled by mentioning them in the research limitations and delimitations.

3.4 Human Resources Used and Testers’ Reliability

In this study, various teachers in physical education field assisted as experts (Appendix – E) in collecting data of pre-test and post-test. Two hours clinic was conducted and the assistants were oriented with training in the procedures of accurate measuring and recording of the scores for each test. Clinic was followed by practical of accurate measuring and recording of scores for each test. As a trial, all the assistants were asked to measure the performance of six
subjects in the specified test. Though help was taken in this process the testers' reliability was determined. (Best & Kahn, 2014) Statistically, reliability of the testers' coefficients was determined by test retest method and found to be 0.97. Therefore the final measurements taken with the help of these assistants were considered reliable and fully justified.

3.5 Criterion Measures and Tools used

In this present investigation, the researcher decided to see the effect of Suryanamaskar, breathing exercises and Omkar chanting on the performance in 50 metre freestyle swimming. Norms were not required; hence 50 metre freestyle swimming performance was tested for comparison and was recorded nearest to 1/100th of a second. A standard cassette to control the timing of each Suryanamaskar was used.

3.5.1 Description of Test

Name: 50 metre swimming freestyle timing

Purpose

To measure forward swimming speed

Instructions

The player assumes a ready position on the starting. On the whistle command the player jumps into the pool and starts swimming 50 metres as fast as possible.

Equipment

A standard swimming pool, a stop watch, whistle, score cards or recording sheets and pencil.
Scoring
The total time elapsed between the start and the moment the student touches the finish wall is the recorded score. Time is reported to the nearest tenth of second.

Organizational Considerations
The time keeper was positioned at the finish wall/line and simultaneously started the stop watch as the starter blew the whistle.

3.6 Validity and Reliability of the program
Researcher designed the program and gave it to the experts. (List is included in the appendix). The experts selected, omitted, deleted, added and modified the program. Final program was designed and got approved. Then pilot study was done. Test-retest reliability was calculated. \( r = 0.87 \)

3.7 Threats to Internal and External Experimental Validity
To deal with threats like testing and statistical regression, researcher used experimental and control group design.

3.8 Procedure of the study
The boy swimmer students \( (N=120) \) were conveniently selected by the researcher for the present study. Their name, birth date and age was collected and confirmed from the school register. These subjects were divided into three groups namely two experimental groups and one control group, each consisting of 40 students. After discussing with the experts, the duration and repetitions of Suryanamaskar, Breathing exercises and Omkar Chanting each were fixed and accordingly the training program was planned.
The entire study or training program was conducted in three phases

a. Pre test

b. Suryanamaskar, Breathing exercises and Omkar Chanting training program of 12 weeks

c. Post test

3.8.1 Pre test

Prior to the actual test, the subjects were demonstrated how to perform the speed test and then they were asked to act according to the instructions. With the help of professionally qualified and trained assistants the pre-test was conducted. On the first day of the pre-test, the 50 metre swimming freestyle performance of all subjects was tested. The assistances were given all information about the test. Demonstration of the test item was shown once. No warm up trail was given to the subjects. All the subjects gave this test and the score was recorded. This test was conducted in the month of December, 2010.

3.8.2 Training Program

The training program commenced immediately from next day after the pre-test. The training was administrated to the subjects in an indoor hall, every morning/evening for 40 to 50 minutes for a period of 12 weeks for 3 days per week between Monday to Saturday. After the pre-test, the training program of Suryanamaskar, Breathing exercises and Omkar Chanting began. The training program was carried out for 12 weeks. The experimental group underwent training in Suryanamaskar, breathing exercises and Omkar chanting for 12 weeks duration from January to April, 2011.
Although warming up is not advocated in swimming, the training program of Suryanamaskar, breathing exercises and Omkar chanting used to begin with light warming up and stretching exercises as a special care to avoid muscle pulls and jerks to any body part. Swimming practice of every subject from both groups was not disturbed and it continued under their coaches.

3.8.3 Daily Routine

The new Suryanamaskar, breathing exercises and Omkar chanting training program was taught step by step. One or two of new postures were introduced per day depending upon the complexity of the posture. Generally the steps in teaching were as follows

- Introduction and Demonstration of the new posture
- Practice of the previous posture
- Trails by the students
- Corrections

Above training of each Suryanamaskar, breathing exercises and Omkar chanting was imparted with proper repetitions along with suitable maintenance time.
Figure 3.2 Sequential positions of each Suryanamaskar and breathing technique
(Adapted from Chitravali – Pictorial booklet)

Siddha: The Ready Position

- Stand erect with feet touching each-other and pressed below; neck straight
- Eyes fixed on the nose-tip
- Palms together, touching each other in front of the chest, fingers in particular, thumbs touching the chest i.e. ‘Namaskar Mudra’
- Fore-arms in line, parallel to the ground.
1. First position

- Palms engaged upwards together in Namaskar-Mudra' itself, pointing towards the sky i.e. ‘Nabho-Vandan’
- Arms and legs straight elbow and knees straightened
- Head well bent back-wards
- Eyes fixed on the wrists, i.e. “Karamula’
- Spine bends back-wards and body above the trunk in a graceful curved arch.

2. Second Position

- Hands downwards in continuous motion without bending in elbows
- Palms flat on the ground, just by the side of each foot
- Distance between the palms equal to that of the shoulders
- Big toes and palms in line from the front
- Legs straight, knees straightened
- Chin touching the chest
- Fore-head touching the knees

3. Third Position

- Keeping right foot and both palms steady on the ground, left leg stretched backwards
- Left knee and toes touching the ground
- Both the arms straight
- Right knee folded; calf, thigh and the last rib touching each-other
- Chest out, shoulders and head thrown backwards, making arch-like spine and eyes towards the sky
4. Fourth Position

- Right leg stretched back without moving both the hands from their places
- Feet touching each other i.e. "Sama-Carana"
- Leg and arms straight, knees and elbows straightened
- Entire body in a straight line from head to heel, supported on fixed palms and toes only
- Eyes fixed on the ground, at right angle to the body

5. Fifth Position

- Arms bent at elbows without moving both the palms and toes
- Forehead, chest and knees simultaneously touching the ground, together with the palms and toes, to achieve 'Sira-Sastanga Namaskar' at eight points
- Chin pressed on the chest
- Nose and pelvic region elevated
- Both the elbows drawn towards each other

6. Sixth position

- Arms straight, elbows straightened
- Chest pushed out
- Shoulders and head thrown back
- Eyes towards the sky
- Waist pulled towards the centre, between the palms
- Spine fully arched
- Knees touching the ground, feet together, toes firm
7. Seventh Position

- Without shifting the palms and the toes from the ground, the torso is raised upwards
- Now the heels touching the ground
- Arms and legs straight, elbows and knees straightened
- Heels, waist and wrists forming a triangle
- Head pulled towards the knees
- Chin touching the chest
- Eyes centered on the nose-tip

8. Eight Position

- Left leg forward, folded in the knee, foot resting between the palms on its original place
- Right knee and the toes touching the ground, without displacement
- Rest of the body as it was in third position
- In order to supplement the movements of the legs, they should be alternately changed in each Suryanamaskar

9. Ninth position

- Keeping the palms fixed on the ground, bring the right foot forward in its original place, aligned with the left foot
- Big toes and heels touching each-other, i.e. ‘Sama-Carana’
- Legs and arms straight, knees and elbows straightened
- Chin touching the chest
- Fore-head touching the knees
- Body vertically well balanced
10. Tenth position

- Body upright akin to the ready position in “Namaskar Mudra”
- Chest out; neck straight
- Eyes pinned on the nose-tip
- This is the last position of the on-going Suryanamaskar; which becomes the “ready” position of the following Suryanamaskar, also to be commenced after a pause of two seconds in breathing

Students should give attention to the special technique of breathing which goes with Suryanamaskar. The breathing is recommended to be of two seconds duration for every position explained. (Modak & Joglekar, 2010) One should inhale (Puraka) and exhale (Rechaka) deeply and slowly. The retention of breath is called Kumbhak, which comes in the fifth and the tenth positions as illustrated below.
Table 3.2 Breathing Chart

<table>
<thead>
<tr>
<th>Count</th>
<th>Action</th>
<th>Breathing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ardha Chandrasana</td>
<td>Purak (Breath in)</td>
</tr>
<tr>
<td>2</td>
<td>Padangusthasana</td>
<td>Rechak (Breath Out)</td>
</tr>
<tr>
<td>3</td>
<td>Ekpadhasthasan</td>
<td>Purak (Breath in)</td>
</tr>
<tr>
<td>4</td>
<td>Chaturang Dandasan</td>
<td>Rechak (Breath Out)</td>
</tr>
<tr>
<td>5</td>
<td>Ashtangasan</td>
<td>Bahyya Kumbhak (Breath Hold Outside)</td>
</tr>
<tr>
<td>6</td>
<td>Bhujangasan</td>
<td>Purak (Breath in)</td>
</tr>
<tr>
<td>7</td>
<td>Ustrasan</td>
<td>Rechak (Breath Out)</td>
</tr>
<tr>
<td>8</td>
<td>Ekpadhasthasan</td>
<td>Purak (Breath in)</td>
</tr>
<tr>
<td>9</td>
<td>Padangusthasana</td>
<td>Rechak (Breath Out)</td>
</tr>
<tr>
<td>10</td>
<td>Tadasan</td>
<td>Purak (Breath in)</td>
</tr>
</tbody>
</table>

The schedule of week-wise maintenance time and repetition of Suryanamaskar, breathing exercises and Omkar chanting is as follows.
3.8.4 Schedule of practising for Suryanamaskar Group (SNG), Breathing and Omkar Chanting group (BOCG) and Control Group (CG).

Table 3.3 Practice for 12 weeks as per schedule

<table>
<thead>
<tr>
<th>Practice</th>
<th>Time (Min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suryanamaskar, Breathing Exercises and Omkar Chanting training program</td>
<td>40-50</td>
</tr>
<tr>
<td>Practice of Swimming as per schedule</td>
<td>120</td>
</tr>
</tbody>
</table>

Note: The weekly schedule is described in detail in appendix D

Before intervention, experts from the field of Suryanamaskar, breathing exercises and Omkar chanting gave lectures on the theoretical background along with a practical demonstration. (Unkule D. N., 2015)

The schedule of 12 weeks training program of Suryanamaskar, Breathing exercises and Omkar Chanting has been presented below.
Table 3.4 Training Schedule for boys under 10 and 12 years of age

<table>
<thead>
<tr>
<th>Week No.</th>
<th>Suryanamaskar (repetitions)</th>
<th>Breathing exercises</th>
<th>Omkar Chanting (repetitions)</th>
<th>Total Time (Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Anulom Vilom (repetitions)</td>
<td>Kapalbhati (repetitions)</td>
<td>(Inclusive of 10 mins warm-up)</td>
</tr>
<tr>
<td>1</td>
<td>13</td>
<td>15</td>
<td>15</td>
<td>26</td>
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<tr>
<td>2</td>
<td>15</td>
<td>18</td>
<td>18</td>
<td>29</td>
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<td>32</td>
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<td>40</td>
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<tr>
<td>12</td>
<td>26</td>
<td>30</td>
<td>30</td>
<td>40</td>
</tr>
</tbody>
</table>

Note: Warm-up includes running, skipping, bending and stretching exercises with towel.
Table 3.5 Training Schedule for boys under 14 and 16 years of age

<table>
<thead>
<tr>
<th>Week No.</th>
<th>Suryanamaskar (repetitions)</th>
<th>Breathing exercises</th>
<th>Omkar Chanting (repetitions)</th>
<th>Total Time (Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Anulom Vilom (repetitions)</td>
<td>Kapalbhathi (repetitions)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>13</td>
<td>15</td>
<td>15</td>
<td>26</td>
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<td>30</td>
<td>50</td>
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</tbody>
</table>

Note: Warm-up includes running, skipping, bending and stretching exercises with towel.
Above tables describe the detailed plan regarding repetition of Suryanamaskar, breathing exercises and Omkar chanting. In the first week of intervention, frequency was low, as the demonstration of each variable was given followed by its actual practice. In second week, practice of each training variable was carried out and corrections were made. From third week onwards till last week, practice and repetition of each variable was carried out with the number of repetitions increased.

Each class of training was for 40 to 50 minutes and all subjects underwent swimming training regularly. Every subject was trained for five days a week for 12 weeks continuously.

3.8.5 Post-test

After the completion of 12 weeks practice training program, the post-test was conducted on all the subjects of control and experimental groups as per the pre-test. This test was conducted in the month of May, 2011. The data was collected and recorded carefully.

3.9 Procedure of the Study

Stage I: Conducting experiment

Following steps were followed at the time of experiment:

1. Pre-testing the subjects with the help of 50 metre freestyle swimming performance test.

2. Randomly dividing the subjects into Suryanamaskar Group (SNG), Breathing and Omkar Chanting Group (BOCG) and Control Group (CG).
3. Giving treatment to SNG and BOCG for 3 months. Before the treatment, the researcher got a consent form filled from participants having a schedule of Suryanamaskar, Breathing and Omkar Chanting.

4. Post-testing the subjects with the help of 50 metre freestyle swimming performance test.

3.10 Statistical tools

As the present study is for identifying the effect of two training methods on the swimming performance, the following tests were utilized:

1. Mean - Mean is the arithmetic average of 50 metre freestyle swimming performance score.

2. Standard Deviation - The standard deviation is the square root of the variance of 50 metre freestyle swimming performance score. (Best & Kahn, 2014)

3. One-Way ANOVA – Simple analysis of variance (ANOVA) or one-way ANOVA is an effective way to determine whether the means of more than two samples are significantly different. (Thomas, Nelson, & Silverman, 2005)
References


