METHOD AND PROCEDURE
CHAPTER-III

METHOD AND PROCEDURE

In this chapter the procedure adopted for selection of subjects, selection of variables, collection of data, criterion measures, reliability of data, procedure for administration of test, the statistical technique to be used have been systematically presented and exhibited in this chapter under the following headings:

3.0.0 Selection of the Subjects

150 junior and senior women boxers in age group of 15 to 25 were selected by stratified and random method of sampling for the present study from Munirka (Delhi), Hisar, Rewari (Haryana), Khanna, Sangrur (Punjab), Alwar, Udepur (Rajasthan) and Almora, Nanital (Uttarakhand) who had participated in national competitions. Prior consent was taken from the respective coaches and all the respondents regarding the purpose and the procedure of data collection. The present study was conducted on 150 female boxers out of which 75 were junior and 75 were senior female boxers. Distribution of the sample is as under:

Systicimatic Representation of Samples
Junior and Senior Females

<table>
<thead>
<tr>
<th>Haryana</th>
<th>Punjab</th>
<th>Delhi</th>
<th>Utrakhand</th>
<th>Rajasthan</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>30</td>
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<td>30</td>
</tr>
<tr>
<td>Jr. 15</td>
<td>Sr. 15</td>
<td>Jr. 15</td>
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</tbody>
</table>

3.1.0 Selection of Variables

The physical and physiological variables selected for the purpose of this study have been chosen very carefully keeping in view of the logical relationship and relative importance of such variables. The research scholar went through the scientific literature pertaining to physical and physiological profiles from different libraries and sources available at M.D. University, Rohtak and also consulted experts in these area to select physical and physiological variables, with regard to the purpose of the study. Along with the said literature and with experts opinion, the administration feasibility in terms of availability of instruments, time factor from point of view of the subjects

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and expertise for measuring and recording of data was also given due consideration while selecting the physical and physiological variables as they are directly related to the total fitness of female boxers and are also associated with the efficient functioning of the circulatory and respiratory systems.

3.2.0 Physical variables
1. Speed
2. Agility
3. Arm and shoulder strength
4. Abdominal strength
5. Explosive strength
6. Endurance
7. Flexibility

3.3.0 Physiological variables
1. Positive breath holding capacity
2. Resting heart rate
3. Systolic blood pressure
4. Diastolic blood pressure

3.4.0 Criterion Measures of Physical and Physiological Variables
1. Speed was measured by conducting 50-yard dash run. The score was recorded to the nearest tenth of a second.
2. Agility was measured by conducting a $4 \times 30$ feet shuttle run. The score was recorded to the nearest tenth of a second.
3. Abdominal strength was measured with the help of bent knee sit ups and the number of sit ups was taken as the score.
4. Explosive strength was measured by (SBJ) the horizontal distance covered in feet and inches between the take off line and landing points on both the feet.
5. Arm and shoulder strength was tested by the help of pull up test and the number of pull up was considered as the score of the test.
6. Endurance was measured by using the Appher's 12-minute run/walk and the score was recorded to the nearest 50 yards/distance.
7. Flexibility was measured by conducting the Sit and Reach test. The score was recorded in inches.
8. Positive Breath Holding Capacity was tested by the help of clip on nose and with a stop watch. The score was recorded in second.
9. Resting Heart Rate was assessed by the number of heart beats per minute by using Automatic Digital Blood Monitor, when the subject was under physical and mental rest.

10. Blood pressure of the subjects was measured in mm.Hg by using Automatic Digital Blood Monitor, when the subject was under physical and mental rest.

3.5.0 Collection of Data

The data for selected physical and physiological variables was obtained with the help of various approved instruments, operated by investigator at the coaching centre Munirka (Delhi), Hisar, Rewari (Haryana), Khanna, Patiala (Punjab), Alwar, Udepur (Rajasthan) and Almora, Nanital (Uttarakhand). The coaches were requested to cooperate fully, which they did. Before the actual testing the subjects were given a complete demonstration of each test and purpose of the test was explained in detail, on the first day morning physiological variables data were collected before the training and on the second day physical fitness variables data was collected at each coaching centre. A brief discussion about the procedure adopted for the conduct of the tests for physical and physiological variables have been given in next pages:
3.6.0 Procedure Administration of the Tests

3.6.1 Physical Variables

AAPHER Youth Fitness Test (1976)¹

SPEED (50 YARDS DASH)

Purpose : To measure the speed of the subjects.

Equipment : Electronic stop watches, clapper.

Description : The subjects were made to ran a distance of 50 yards. On the command "on your marks", the subject stood on the starting line and started, when the clapper sounded. Only two subjects ran at a time. They ran up to the finish line, which had been marked 50 yards away and two time keepers for each runner recorded the time.

Scoring : The time was recorded of the nearest 10\textsuperscript{th} of the second.


Fig. 1 : 50 Yards Dash Run
AGILITY (Shuttle Run)

Purpose : To measure agility of the subjects.
Instrument : Two wooden blocks of 2×2×4 inches, Electronic stop watch.
Procedure : Two parallel lines A and B were marked on the ground 30 feet apart. For this test item, the starting and finishing line was the same. Two wooden blocks were placed behind the line ‘A’. Each subject positioned herself behind the line ‘B’ and on the signal “ready, go” ran to the opposite end line, picked up a block, ran back to the starting line, placed the block behind it, ran back and picked up the second block and carried it across the starting line.
Scoring : Time was clocked from the starting to the carrying of the second wooden block across the starting line to the nearest 1/10th of a second. Two trials were allowed and the better time recorded on this test item was taken as subjects’ score.

Fig. 2 : Agility 4 × 30 Feet Shuttle Run
ARM AND SHOULDER STRENGTH (Pull-Ups)

Purpose: To measure the arms and shoulder strength of the subjects.

Equipment: Approximately 1½ inches in diameter a horizontal bar

Description: The bar was adjusted to a height that permitted the subject to hang free from the floor. For pulls ups, the subject was made to hang on a horizontal bar with palms facing forward. The subject was asked to pull his body upward by bending the elbows until the chin reached the bar and then back to the initial stage. This continued for a maximum number of times without swing in the body.

Scoring: The number of correctly done pull ups was recorded as the score.

Fig. 3: Arm and Shoulder Strength (No. Pull-ups)
ABDOMINAL STRENGTH (Sit-Ups)

**Purpose**
To measure the abdominal strength of the subjects.

**Equipment**
Electronic stop watch.

**Description**
The subject was instructed to lie on his back bending his knees and keeping feet on the floor so that the heels might not be more than twelve inches away from the buttocks and the angle of the knee must be 90 degrees. Then, she was asked to put her hands at the back of her neck or side ways along the floor. A partner was asked to hold her feet to keep them in contact with the floor. Then by flexing abdominal muscle she brought her head towards the knees. This action constructed one sit-up.

**Scoring**
Maximum number of correctly executed sit-ups performed in one minute were recorded.

![Fig. 4: Abdominal Strength (No. of Sit-ups)](image-url)
EXPLOSIVE STRENGTH (S.B.J.)

Purpose: To measure the explosive strength of the subjects.

Equipments: A measuring steel tape, long jumping pit.

Description: Each subject was asked to stand behind a take off line with her feet comfortably apart. Before jumping, the subject was allowed dipping at the knees and swing the arms backward and then jump forward by simultaneously extending the knees and swinging arms forward to cover maximum possible horizontal distance, landing on both the feet.

Scoring: The recommended procedure was to administer three trials and award the subject the best of the three trials. The test was scored in feet and inches.

Fig. 5: Explosive Strength (S.B.J.)
ENDURANCE (12 Minute Run/Walk) yards

Purpose: To measure the endurance of the subjects.

Equipment: Electronic stop watches, marker flags, measuring steel tape.

Description: The subjects were made to walk / run for 12 minute continuously. A standard track was used for conducting this test. The track was divided into segments of 10 yards and marker flags were kept at the inner edge of the track. The subjects were given a briefing. On the signal “Go” they started running or walking in batches of 15 in 2 groups. On completion of 12 minutes signal was given to the subjects to stop running.

Scoring: The distance covered by each subject was recorded to the nearest 10 yards.

Fig. 6: Endurance (12 Minute Run/Walk) yards
FLEXIBILITY (Sit and Reach Test)

To measure the flexibility of back and leg (hamstring) muscle. Measuring Tap and Testing Box were used, the subjects were asked to remove their shoes and place their feet against the testing box without bending their knees. The subjects were then asked to place their one hand on top of the other so that the middle fingers of both hands may come together at the same length.

The tester kept his hand on the knees of the subject to keep their knees straight, not allowing any bending of the knees. At the same time the subjects were instructed to lean forward and place their hands over the measuring scales lying on top of the box. Then, they were asked to slide her hand along the measuring scale as far as possible without bouncing and were asked to hold the farthest position for at least one second. Each subject was given 3 trials the highest or best score, nearest to an inch was recorded to obtain the score of flexibility.

Fig. 7: Flexibility (Sit and Reach Test)

3.6.2 Physiological Variables

POSITIVE BREATH HOLDING CAPACITY (Sec.)

Purpose : To measure the positive breath holding capacity of the subjects.

Instrument : Electronic stop watch and nose clip.

Description : A suitable chair was provided to the subjects to sit comfortably. The subject was asked to take maximum possible inhalation in one single breath and hold it for whatever time it was possible for her to do so. As soon as their chest movement was observed to have stopped consequent to full inspiration, her nose was pinched with a clip and simultaneously a stopwatch was started. The subject was instructed to prevent the leakage of air through the mouth, to keep her mouth close and was instructed to open her mouth to take in breath when she was unable to hold the breath any longer. As soon as she opened her mouth, the stopwatch was stopped.

Scoring : The time of holding the breath was recorded to the nearest second. Best of the three successive attempts with suitable rest interval in between was recorded as her score.

Fig. 8 : Positive Breath Holding Capacity (Sec.)
RESTING HEART RATE (Beats/Min.)

Purpose : To measure the number of pulse rate of the subject per minute.

Equipment : Automatic digital blood pressure monitor.

Description : The resting heart rate of each of the subject was recorded between 7.00 a.m. and 8.00 a.m. Before recording the resting heart rate, the subject was instructed to remain lying for 10 minutes. The pressure cuff was wrapped snugly above the elbow around the arm. To record the heart rate, automatic digital blood pressure monitor was used for one full minute. The start/stop button was pressed. All elements displayed '888' in 3 seconds. The moment of measuring blood pressure symbol flashed on the display, the air pressure automatically pumped up to 195 mmHg. Then it automatically started decreasing in order to detect heart beat. No movement and talking were permitted in the midst of taking heart rate.

Scoring : Score was recorded in number of pulse per minute.

Fig. 9 : Resting Heart Rate (Beats/Min.)
BLOOD PRESSURE (mmHg)

Purpose : To measure systolic and diastolic blood pressure of the subjects.

Equipment : Automatic digital blood pressure monitor.

Description : The blood pressure of each subject was recorded between 6-8 a.m. Before recording the blood pressure the subjects were instructed to remain lying for 10 minutes. The pressure cuff was wrapped snugly above the elbow around the arm. To record the heart rate, automatic digital blood pressure monitor was used for one full minute. The elbow was to be kept at the level of heart. Hands were relaxed with the palm facing up. The start/stop button was pressed. All elements displayed ‘888’ in 3 seconds. The moment of measuring blood pressure symbol flashed on the display, the air pressure automatically pumped up to 195 mmHg. Then it automatically started decreasing in order to detect blood pressure. The detected systolic and diastolic pressure lasted on the display screen for one minute. No movement and talking were permitted in the midst of taking blood pressure measurements.

Scoring : The blood pressure was recorded in mmHg.

Fig. 10 : Blood Pressure (mmHg)
3.7.0 Reliability of Data

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

3.8.0 Instrument Reliability

The instrument used to measure blood pressure (systolic and diastolic) and heart rate was a standard automatic digital blood pressure monitor (Automatic Model HEM 7101) supplied by ORMAN Health Care Company Ltd., Tokyo, Japan and for other tests, electronic stop watches ((Swiss made, supplied by Krishna Watch Co., Bombay), steel tapes (with approved ISI mark), nose clip, whistle, horizontal bar were supplied by standard manufacturers were used for the study.

3.9.0 Tester competency

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

3.10.0 Reliability of Tests

Reliability of tests was established by test-retest method using product moment method of correlation. The score of subjects for various qualities were recorded on two days with a gap of one day in between under identical conditions.

The obtained correlations have been shown in Table 1. Since very high correlations from 0.91 to 0.98 were obtained, investigator's competency to administer the tests as well as reliability of tests were established. From the Table 1, it was evident that tester reliability was significantly high. This establishes competency of scholar to administer the tests.
### Table 1
Co-efficient of Reliability

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Variables</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Speed 50 Yards Dash (Sec.)</td>
<td>0.98*</td>
</tr>
<tr>
<td>2</td>
<td>Agility 30 feet shuttle run (Sec.)</td>
<td>0.97*</td>
</tr>
<tr>
<td>3</td>
<td>Arm and Shoulder Strength Pull ups (No.)</td>
<td>0.96*</td>
</tr>
<tr>
<td>4</td>
<td>Abdominal Strength Sit ups (No.)</td>
<td>0.95*</td>
</tr>
<tr>
<td>5</td>
<td>Explosive Strength S.B.J. (Feet &amp; inches)</td>
<td>0.98*</td>
</tr>
<tr>
<td>6</td>
<td>Endurance 12 min. Run/Walk (Distance in Yards)</td>
<td>0.96*</td>
</tr>
<tr>
<td>7</td>
<td>Flexibility Sit and reach band (Inches)</td>
<td>0.95*</td>
</tr>
<tr>
<td>8</td>
<td>Positive Breath Holding Capacity (Sec.)</td>
<td>0.91*</td>
</tr>
<tr>
<td>9</td>
<td>Resting Heart Rate (Beats)</td>
<td>0.97*</td>
</tr>
<tr>
<td>10</td>
<td>Blood Pressure Systolic (mmHG)</td>
<td>0.96*</td>
</tr>
<tr>
<td>11</td>
<td>Blood Pressure Diastolic (mmHG)</td>
<td>0.95*</td>
</tr>
</tbody>
</table>

* Significant at 0.05 level of significant.

N = 20
r.05(18) = 0.444

### 3.11.0 Subjects Reliability

The above test-retest coefficient of correlation method also established that the subjects' reliability was significant at 0.05 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 was given.
3.12.0 Statistical Procedure

1. In order to determine the characteristics of Physical fitness variables of junior level boxers of northern states of India, mean and standard deviation, minimum, maximum and range were used.

2. In order to determine the characteristics of Physical fitness variables of senior level boxers of northern states of India, mean and standard deviation, minimum, maximum and range were used.

3. In order to determine the characteristics of Physiological variables of junior level boxers of northern states of India, mean and standard deviation, minimum, maximum and range were used.

4. In order to determine the characteristics of Physiological variables of senior level boxers of northern states of India, mean and standard deviation, minimum, maximum and range were used.

5. In order to compare junior and senior level female boxers of northern states of India within state in relation to Physical fitness variables 't' test was used

6. In order to compare junior and senior level female boxers of northern states of India within state in relation to Physiological variables 't' test was used

7. In order to compare difference among different states of northern India (Delhi, Haryana, Punjab, Rajasthan and Uttarakhand) in relation to Physical fitness variables of junior level boxers ‘One Way Analysis of Variance’ was used.

8. In order to compare among different states of northern India (Delhi, Haryana, Punjab, Rajasthan and Uttarakhand) in relation to Physical fitness variables of senior level boxers ‘One Way Analysis of Variance’ was used.

9. In order to compare among different states of northern India (Delhi, Haryana, Punjab, Rajasthan and Uttarakhand) in relation to Physiological variables of junior level boxers ‘One Way Analysis of Variance’ was used.

10. In order to compare among different states of northern India (Delhi, Haryana, Punjab, Rajasthan and Uttarakhand) in relation to Physiological variables of senior level boxers ‘One Way Analysis of Variance’ was used.