CHAPTER-III
PROCEDURE

In this chapter selection of the subjects, reliability of data, instrumental reliability, testers competency, subject reliability, criterian measure, collection of data, identification of test battery and statistical techniques for norms have been explained.

SELECTION OF SUBJECTS

The subjects of this study were one hundred sixty. Judokas who participated in the National Judo Competitions. The subjects were drawn from the Para-Military and State teams, namely C.R.P.F, B.S.F, Haryana, Delhi, Chandigarh and Uttar Pradesh.

SELECTION OF SPECIFIC PHYSICAL FITNESS TEST

In order to select a specific physical fitness test, first of all, a list of selected test items were finalized, keeping in mind the relevancy for measuring the physical fitness of Judokas. A systematized list of twenty two physical fitness items, including Height, Weight and Age were chalked out by the researcher with the help of Judo Coaches and experts in Physical Education. The specific physical fitness components such as muscular strength, speed, endurance, flexibility, agility and co-ordination were kept in mind to prepare the valid instructions for the test items. A pilot study was conducted on selected Physical Fitness test items which are given in table - 1.
## TABLE - I

### LIST OF SELECTED PHYSICAL FITNESS TEST ITEMS

<table>
<thead>
<tr>
<th>S.NO</th>
<th>S.NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Muscular Strength</td>
</tr>
<tr>
<td></td>
<td>2.</td>
</tr>
<tr>
<td></td>
<td>3.</td>
</tr>
<tr>
<td></td>
<td>4.</td>
</tr>
<tr>
<td></td>
<td>5.</td>
</tr>
<tr>
<td>2.</td>
<td>Speed</td>
</tr>
<tr>
<td></td>
<td>2.</td>
</tr>
<tr>
<td></td>
<td>3.</td>
</tr>
<tr>
<td>3.</td>
<td>Endurance</td>
</tr>
<tr>
<td></td>
<td>2.</td>
</tr>
<tr>
<td></td>
<td>3.</td>
</tr>
<tr>
<td>4.</td>
<td>Flexibility</td>
</tr>
<tr>
<td></td>
<td>2.</td>
</tr>
<tr>
<td>5.</td>
<td>Agility</td>
</tr>
<tr>
<td></td>
<td>2.</td>
</tr>
<tr>
<td></td>
<td>3.</td>
</tr>
<tr>
<td>4.</td>
<td>Co-ordinative Ability</td>
</tr>
<tr>
<td></td>
<td>2.</td>
</tr>
</tbody>
</table>
RELIABILITY OF DATA

Reliability of the data depends upon the instrument, tester's competency, subjects reliability and reliability of the test and hence the reliability of these items was established scientifically.

INSTRUMENT RELIABILITY

The stop watches, measuring tapes, flexometer and Grip and Dynamometer used in this study were calibrated and supplied by the leading firms namely Anand agency, Pune, 1995. And their reliability was ensured by the manufactures. The material used was of fine quality. The stop watches measuring 1/100 of second were used. Thus the instruments were considered reliable for the purpose of this study.

TESTER'S COMPETENCY

The researcher himself being a university and state level Judo player and specialized in Judo is quite well acquainted with the techniques for conducting tests. However, he had a number of practice sessions in the testing procedure under the guidance of his supervisor to acquire proficiency in testing. All the measurements were taken by the investigator himself with the assistance of qualified personnel and Judo coach, who were trained and acquainted with the tests and testing procedures. Testers competency was evaluated by test retest method and consistency of results was obtained by product moment correlation. The test-retest scores for all test items were than correlated and co-efficient thus obtained has been presented in Table -2
### TABLE - 2

**RELIABILITY OF COEFFICIENT OF TEST-RETEST SCORE**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>TEST</th>
<th>COEFFICIENT OF CORRELATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Age</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>Height</td>
<td>-</td>
</tr>
<tr>
<td>3.</td>
<td>Weight</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>Bass stick test</td>
<td>.92</td>
</tr>
<tr>
<td>5.</td>
<td>Modified Push-ups</td>
<td>.96</td>
</tr>
<tr>
<td>6.</td>
<td>Pull – Ups</td>
<td>.89</td>
</tr>
<tr>
<td>7.</td>
<td>Standing Broad Jump</td>
<td>.82</td>
</tr>
<tr>
<td>8.</td>
<td>Right Grip Strength</td>
<td>.96</td>
</tr>
<tr>
<td>9.</td>
<td>Left Grip Strength</td>
<td>.86</td>
</tr>
<tr>
<td>10.</td>
<td>Sit Ups</td>
<td>.85</td>
</tr>
<tr>
<td>11.</td>
<td>30 Meters Run</td>
<td>.86</td>
</tr>
<tr>
<td>12.</td>
<td>50 Meters Run</td>
<td>.91</td>
</tr>
<tr>
<td>13.</td>
<td>Speed of Movement</td>
<td>.78</td>
</tr>
<tr>
<td>14.</td>
<td>3 Minutes Run</td>
<td>.92</td>
</tr>
<tr>
<td>15.</td>
<td>6 Minutes Run</td>
<td>.91</td>
</tr>
<tr>
<td>16.</td>
<td>9 Minutes Run</td>
<td>.79</td>
</tr>
<tr>
<td>17.</td>
<td>Bridge Up Test</td>
<td>.98</td>
</tr>
<tr>
<td>18.</td>
<td>Modified Sit and Reach Test</td>
<td>.99</td>
</tr>
<tr>
<td>19.</td>
<td>Shuttle Run</td>
<td>.86</td>
</tr>
<tr>
<td>20.</td>
<td>Side Step Test</td>
<td>.93</td>
</tr>
<tr>
<td>21.</td>
<td>Burpee Exercise</td>
<td>.91</td>
</tr>
<tr>
<td>22.</td>
<td>Foot-Reaction Time Test</td>
<td>.79</td>
</tr>
</tbody>
</table>

N(20) D/F 18 at 0.5 level = .444
SUBJECT'S RELIABILITY

The test-retest coefficient of correlation was established the subject's reliability, because the same subjects were used under similar conditions by the same tester and no motivational techniques were used. The coefficient of reliability of height, weight and age were not drawn because their values were constant from the test retest coefficient of correlation are given in Table 2.

CRITERIAN MEASURE

To construct Specific Physical Fitness test battery for National level Judokas, twenty-two test items were administered on the Judokas and their raw scores were considered as criterion measure for this study.

COLLECTION OF DATA

The data of the chosen test items were collected in two phases. In first phase to establish the validity of data of 22 test items were collected to develop the norms of the finally selected test items for the specific physical fitness test conducted on the selected Judokas.

COLLECTION OF DATA FOR THE FIRST PHASE OF THE STUDY

The data for the first phase of the study were collected on 160 Judokas selected from various states and Para-military forces, namely Haryana, Chandigarh, Delhi, U.P, C.R.P.F and B.S.F. They represented their respective state in the National Judo Championship. Sample were drawn from those subjects who had participated in National Judo Championship.

The data were collected during the peak season of Judokas. This period was considered to be the best period for the collection of data as the Judokas were brought to have acquired maximum fitness. Before the testing programme was
organized, the researcher assembled all Judokas together to brief them on the nature, the modalities and the objectives of the present investigation. The scholar gathered the subjects of each team at different periods of time and demonstrated to them various tests so that they could form a mental picture of various test they were going to take.

**ADMINISTRATION OF TESTS**

The help of qualified Judo coaches and teachers of physical education was taken by the scholar to administer the test to the subjects. The investigator took care to explain the tests and the testing procedure to the helpers and the subjects. All the test items were then demonstrated to the Judokas so that the subjects could form a mental picture of various tests they were going to take. Stress was laid on to ensure uniformity, accuracy and standardization in the administration of the tests. No motivational techniques were used to enhance their performances. But each subject performed on each test enthusiastically with the spirit of competition to surpass his counter parts and know his status of physical fitness.

**MODIFIED PUSH UPS**

The subject was asked to take dip position and the partner held his both ankles and lifted him to his shoulder level. From this position, on signal 'start' the subject dipped the whole body thus bringing down the entire body weight on his hand by flexing the elbows (Figure 2.1). He then lifted the body weight up by extending the elbows and returned to the starting position. This was considered as score one. This process was continue to the maximum till the subject, got tired completely. Swinging of the body or stopping in between was not allowed. Push-ups was considered complete when the arms were fully flexed and then extended. Bending of the elbows was not counted as complete 'Push-ups'.
Fig. 2.1

MODIFIED PUSH-UPS
The total number of completed push-ups without any break were recorded as score of each subject.

**PULL-UPS**

The subject was asked to perform as many pull-ups as possible from a horizontal bar of such a height that the foot of the tallest Judokas did not touch the floor while performing the test.

In taking the pull-up test the Judokas hand from the bar by his hands with outer hand grip and chinned himself as many items as he could (figure 2.2). While executing this test he pulled himself up until his chin was reached above the horizontal bar, then lowered himself until his elbows were fully straight. He was not permitted to kick, jerk or swing the body.

The number of completed pull-ups was recorded as a score in shoulder griddle strength of each subject.

**STANDING BROAD JUMP**

A take off line was drawn near one edge of a jumping pit. The subject asked to take his position with toes just behind the take off line, feet slightly apart. Taking off from both feet simultaneously, he jumped to cover maximum possible horizontal distance, landing on both feet. While jumping, he was allowed to crouch and swing the arms to aid the jump to attain maximum distance (figure 2.3). Three trails were given to each subject, the best of among these was credited as his score. His jumping pit was filled with fine river sand and frequently leveled with a long wooden block.
Fig. 2.2
PULL-UPS
Fig. 2.3

STANDING BROAD JUMP
The horizontal distance between the take off line and the nearest break mode in landing pit was measured. The distance measured in meters, was recorded to nearest cm as the score for explosive leg strength of the subject.

**TEST FOR GRIP STRENGTH**

The tester took the right corner of the dynamometer between the thumb and the fore finger of his right hand and placed in palm of the subject. Hands while holding the hand to be tested with his left hand in such a manner that the corner edge of the dynamometer was between the first and second joints of the finger's and the rounded edge was against the base of the hand. The Thumb touched the first finger. The dial of the dynamometer was placed face down in the hand. In taking the test, the subjects elbow was slightly bent and his hand described a sweeping downward as the subject, squeezed the dynamometer (figure 2.4). The hands were not allowed to touch the body or any object while the best was being administered.

Only one trial was given but one or two practice trails were allowed. The score was recorded to the nearest kilogram.

**SIT UPS**

The Judokas assumed a supine position, knee bent at an angle less than 90 and fingers of hands inter-locked behind the neck. The Judoka brought his elbows forward towards his knees in a curl-up motion and then returned to supine position (figure 2.5).

The number of completed sit ups to the nearest whole number were recorded as a score for the strength of abdominal muscles of the subject.
Fig. 2.4

GRIP STRENGTH TEST ON GRIP DYNAMOMETER
30 METERS RUN

Two parallel lines 30 meters apart from each other were marked (figure 2.6). Two subjects were tested at a time. They were asked standing start from behind the starting line. The clapper was clapped after the caution "ready" was given to the subjects. The starter stood in such a position, so that the 'V' of the clapper (open before clap) was visible to the time keepers. As the 'V' closed, the clap was executed, the time keepers at the finish line started their stop watches. The subjects sprinted as fast as possible across the finish line and the stop watches were stopped, as and when the concerned subject crossed the finish line.

The elapsed time, from the starting signal until the subject crossed the finish line was recorded to the nearest 1/100 of a second as the score of each subject.

50 METERS RUN

Two parallel line 50 meters apart from each other were marked (figure 2.7). Two subjects were tested at a time. They were asked to take standing start behind the starting line. The clapper was clapped after the caution "ready" was given to the subjects. The starter stood in such a position, so that the 'V' of the clapper (open before clap) was visible to the time keepers. As the 'V' closed when the clap was executed, the time keepers at the finish line started their stop watches. The subjects sprinted as fast as possible across the finish line and the stop watches were stopped, as and when the concerned subject crossed the finish line.

The elapsed time, from the starting signal until the subjects crossed the finish line was recorded to the nearest 1/100 of a second as the score of each subject.
Fig. 2.6

THIRTY METRE RUN
Fig. 2.7
FIFTY METER RUN
SPEED OF MOVEMENT

Each subject was asked to sit on a chair with his fingertips touching the edge of a table. Two lines one foot apart were marked on the table in such a way that the palms faced each other on the two lines marked on the table. At the ready position, it was made sure that the subject hands did not move before the falling of measure scale, marked in centimeters. The tester held the timer scale near its top so that it hung midway between the subject hands after the command "ready" was given, the timer was released and the subject attempted to stop it as quickly as possible by bringing the hands together in a clapping motion (figure 2.8).

The score of the subject was noted at the point just above the upper edge of the hands after the catch. The tester could thus record the speed of movement for each subject.

THREE MINUTES RUN

Five to six runners selected of random were instructed to run simultaneously and continuously for three minutes on a 400 meters track/Hockey/Football field. They were asked not to walk or stop in between the run and each runner was assigned an observer to measure the distance of the subject (figure 2.9).

The total distance covered in three minutes was recorded to the nearest of a meter as the score of each subject.

SIX MINUTES RUN

Five to six runners were instructed to run simultaneously and continuously for six minutes on a 400 meters track/Hockey/Football field. They were asked not
Fig. 2.8

HAND REACTION TIME
Fig. 2.9
THREE MINUTE RUN
to walk or stop in between the run. Each runner was assigned an observance to measure the distance of the subjects.

The total distance covered in six minutes was recorded to the nearest of a meter as the score of each subject.

**NINE MINUTES RUN**

Five to six runners were instructed to run simultaneously and continuously for nine minute on a 400 meters track/Hockey/Football field. They were asked not to walk or stop in between the run. Each runner was assigned an observer to measure the distance of the subject (figure 2.10).

The total distance covered in nine minutes was recorded to the nearest of a meter as the score of each subject.

**BRIDGE UP TEST**

The subject assumed supine position on the floor and he raised his body to make an arch. While making an arch the hands and feet were brought as close to each other as possible (figure 2.11).

The tester, who took up his position at one side of the subject, placed zero end of the yard stick on the floor and slided the fleximeter vertically upward until the ruler arm touched the highest point of the subjects arched spine. The reading (to the nearest quarter of an inch) was recorded by reading line of the upper edge of sliding arm.

The best score (to the nearest quarter of an inch) of the three trails was recorded as the score of each subject.
HEIGHT

The height of the subjects were measured with subject standing erect without shoes, against a wall close to a marked scale. The subjects were instructed to keep the heels together, body touching the wall with heels, buttocks and back and head erected without tilting and to take hold a full breath by standing erect, while height measurement was taken. A stiff hard board was held horizontally on subject's head, then slightly pressing the head and touching the scale, marked on the wall at right angle. The subject was asked to step out by lowering the head and the reading indicated by the lower end of the hard board was taken. Height was recorded to the nearest of a centimeter.

WEIGHT

The weight of the subject was taken with the help of a standard and calibrated weighing machine in kilograms. A subject was asked to stand barefooted on the weighing machine in a still position, keeping the body erect. The score was recorded to the nearest of a kilogram.

AGE

Age of the subjects were determine as per their high school certificate record and recorded in completed years on the day of the text.
Fig. 2.10
NINE MINUTES RUN
Fig. 2.1J
BRIDGE TEST
SIT AND REACH TEST

The subjects were asked to sit on the mat, with feet in the footprints on the cross-board which was consisted of 20.32 cm x 60.96 cm piece of plywood with lines drawn horizontally at 1 cm intervals and center line was marked zero. They were asked to keep their knees straight, then the subject was to bob forward for four times and hold position of maximum reach on the fourth movement for a count of three.

The score was taken to nearest inches of maximum reach. If the hands reached unevenly, the hand covering the shortest distance was taken as score. Three trials were given and best of one was considered as score of the subject. (fig 2.12). Barrow and Magees (1972).

SHUTTLE RUN

Two parallel lines were marked on the ground, ten meters apart. For this test items, starting and finishing lines were the same. Two wooden blocks were placed in each lane behind the restraining line (figure 2.13). The subjects, positioned themselves behind the starting line. On the command 'Go' they ran to the opposite end line picked up a block, ran back to the starting line, placed the block behind it, ran back again and picked up the second block and carried it across the starting line. The time of each run between the starting and crossing the same on second return was taken by two timers. Two trails were allowed alternately by two another pairs of subjects were tested.

Best timing of two trails was recorded to the nearest on 1/100th of the second was recorded as the score of the subject.
Fig. 2.12
SIT AND REACH TEST
Fig. 2.13

SHUTTLE RUN
SIDE STEP TEST

Three five feet long parallel lines on the ground with a distance of four feet each were drawn (figure 2.1$^\text{s}$). The student assumed a starting position astride the center line with his feet parallel to the line. At the signal 'Go' the student's side steps to his left so that his foot touches the ground beyond the four feet line. This was counted as score one, then he step to his right side and repeats it alternatively. The student was not allowed to cross his feet at any time and turn his shoulder or hips. He counted side steps in this manner as fast as possible for ten seconds without any break.

The number of completed steps executed in 10 seconds by each subject was recorded as his score.

BURPEE EXERCISE

The subject adopted a standing position, to start the exercise the command was given 'Ready' and 'Go' and for discontinuing the exercise the command 'stop' was given. The exercise was performed for a duration of 30 seconds for a many times as possible by adopting a correct position as given in (figure 2.1$^\text{s}$). The exercise was performed in parts from the standing position '1' bent at the knee and waist and placed the hand on the ground in front of the feet. '2' thrust the legs back ward to front leaving rest position. '3' return to the squat position and '4' stand erect. This whole process is one count. The exercise was repeat as many times as possible for a duration of 30 seconds. The tester recorded the time and the assistant counted the number of exercise performed by the subject.

The number of correct exercise executed in 30 seconds by each subject was recorded as his score.
Fig. 2.14
SIDE STEP TEST
Fig. 2.15
BURPEE EXERCISE
FOOT REACTION TIME TEST

The subject was asked to sit on a table which is about one inch away from the wall with his shoe off. The subject positions his foot so that the ball of the foot is held about one inch from the wall with the foot resting on the table top about two inches from the table edge. The tester hold the reaction timer stick near the wall so that it hangs between the wall and the subject’s foot with the base line of the timer opposite to the end of the big toe (figure 2.16). The subject is asked to look at the concentration zone and to react as soon as the timer is dropped by pressing the timer stick against the wall with the ball of the subject foot. Twenty trails were given to each subject.

The reaction time of each trail was recorded from the line just above the end of the big toe when the foot is pressing the stick to the wall. The average of the middle ten trails was recorded as the score of each subject.

BASCO and GUSTAFSON’S (1983), P 697.

BALANCE ABILITY MEASURE

With hands on hips, balance on a wooden rail which is three fourth of an inch wide 1 ½ inch high, twenty four inches long. The preferred foot was placed length wise on the rail and the student was allowed one trial with the eyes open prior to being tested with eye closed (figure 2.17). Two trails were given on rail with eye closed.

The total sum of two trails with a maximum of 20 second allowed for each trial was recorded as the score to measure balance ability of each subject.

BASCO and GUSTAFSON’S (1983), P 68.
Fig. 2.16
NELSON FOOT REACTION TEST
Fig. 2.17
BAAS STICK TEST
THE SECOND PHASE OF STUDY AND THE COLLECTION OF DATA

In the second phase of the study, a fresh data on 200 Judokas were collected. During the administration of newly developed specific physical fitness test, six variables (Table -3) for the collections of data were identified and the same procedure was followed as mentioned in the first phase of this chapter.

TABLE - 3

ADMINISTRATION OF SPECIFIC PHYSICAL FITNESS TEST FOR THE DEVELOPMENT OF NORMS

<table>
<thead>
<tr>
<th>TEST</th>
<th>COMPONENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Right Grip strength</td>
<td>Grip strength</td>
</tr>
<tr>
<td>2. Sit &amp; Reach test</td>
<td>Flexibility</td>
</tr>
<tr>
<td>3. Sit ups</td>
<td>Muscular Endurance</td>
</tr>
<tr>
<td>4. 30 meter run</td>
<td>Explosive Speed</td>
</tr>
<tr>
<td>5. Standing Broad Jump</td>
<td>Explosive strength</td>
</tr>
<tr>
<td>6. Pull - ups</td>
<td>Arm &amp; shoulders strength</td>
</tr>
</tbody>
</table>

Under the uniformity survey of physical fitness test for Judokas data were taken from different state teams of Northern region and Para-Militatry Forces, namely Haryana, Chandigarh, Delhi, U.P., C.R.P.F and B.S.F.

STATISTICAL PROCEDURE

The main purpose of this investigation was to construct the specific physical fitness test for National Level Male Judokas.
Factor analysis technique was used as an instrument to select the test items out of twenty two variables, best suited to measure the specific physical fitness of Judokas.

The correlation matrix of the inter correlation between the 22 variables were obtained by applying Pearson's product movement method. Utilizing the principle axis form of preliminary rotation was used to obtain rotated condition matrix selected for inter-representation as recommended by Cumbee (1954). For rotated factor the Kaisers Varimax Criterian (1958) was used. Analysis of variance (ANOVA) was applied to four weight categories (weight category I, 56 to 61 kg, weight category II 66kg to 73 kg, weight category III 81 kg to 86 kg, weight category IV 90 to 100 kg). On each test items to ascertain the mean difference between the score of each weight category T scale, Hull scale and Sigma scale were used for the development of norms. All statistical analysis were got done on an SPSS windows computer system.