Chapter – III

PROCEDURE

In this chapter, the selection of subjects, selection of specific fitness test items, criterion measures, collection of data, reliability of data, administration of tests and statistical techniques for analysis of data have been explained.

Selection of Subjects

Subjects for this study were selected from the participants of All India Intervarsity Judo Championship. Only 150 male Judokas were selected. The age group of subjects ranged between 17 to 25 years.

Selection of Specific Fitness Test Items

In order to select a specific fitness test, first of all a list of selected test items were finalised, keeping in mind the relevance of measuring the physical fitness of judokas. A systematized list of 19 physical fitness items were chalked out by the researcher with the help of Judo Coaches and experts in the field. The specific physical fitness components such as strengths endurance, speed, speed of movement, endurance, flexibility and explosive power were kept in mind to prepare the valid test items. The pilot study was conducted on all 19 selected test items which are given in Table 1.
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Fitness Components</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Strength Endurance</td>
<td>1. Shoulder</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pull-ups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Modified dips</td>
</tr>
<tr>
<td>2.</td>
<td>Abdomen</td>
<td>Modified sit-ups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Raising and holding legs and upper body</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Holding the legs in raised position</td>
</tr>
<tr>
<td>3.</td>
<td>Legs</td>
<td>Half squats with a partners of equal body weight</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Half squat with weight (Maximum capacity)</td>
</tr>
<tr>
<td>2.</td>
<td>Speed</td>
<td>1. 30 metre Run</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. 50 metre Run</td>
</tr>
<tr>
<td>3.</td>
<td>Speed of Movement</td>
<td>1. Uchikomi with Seoi Nage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Uchikomi with O-goshi</td>
</tr>
<tr>
<td>4.</td>
<td>Endurance</td>
<td>1. Squat thrust for one minute</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Squat thrust for one and half minute</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. 3 minutes run / walk</td>
</tr>
<tr>
<td>5.</td>
<td>Flexibility</td>
<td>1. Bridge-up test</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Modified sit and reach test</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Extent flexibility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Medicine Ball Throw</td>
</tr>
</tbody>
</table>
Criterion Measures

The following criterion measure were chosen for the administration of fitness test items for constructing a specific fitness test battery for Judokas:

1. Shoulder strength endurance was measured by (a) Pull-ups and (b) Modified dips, and the scores were recorded in numbers.

2. Abdominal strength endurance was measured by (a) Modified sit-ups (b) Raising and holding the legs and upper body (c) Holding the legs in a raised position. The scores were recorded in numbers and seconds respectively.

3. Legs strength endurance was measured by (a) Half squats with a partner of an equal body weight, and (b) Half squat with weight (maximum capacity) and scores were recorded in numbers and kilograms respectively.

4. Speed was measured by (a) 30 metres and (b) 50 metres run test. Elapsed time was recorded to the nearest 1/10 of a second as the score.

5. Speed of movement was measured by (a) Uchikomi with O-goshi and (b) Uchikomi with Seoi-Nage tests. Scores were number of performance in one minute.

6. Endurance was measured by (a) Squat thrust for one minute, (b) Squat thrust for one and half minute and (c) Three minutes run test. The scores were recorded in numbers and metres respectively.

7. Flexibility was measured by (a) Bridge-up test (b) Modified sit and reach test and (c) Extent flexibility. The scores were recorded in metres.
8. Explosive Power (a) Standing broad jump test was used and the distance covered was measured in metres. (b) Medicine ball throw test was also administered to measure the explosive power and scores were measured in metres.

**Collection of Data**

The data on selected test items were collected from intervarsity level Judokas. Scholar visited coaching camps of Lucknow University, Lucknow; D.D. Upadhyay University, Gorakhpur, M.D. University, Rohtak and LNIPE (Deemed University), Gwalior etc. for the purpose and rest of the data were collected during All India Intervarsity Competition held in the year 2002-03 at Punjab University, Chandigarh and in 2003-04 at Punjabi University, Patiala.

Before the testing programme was organised, the researcher assembled all the Judokas together to brief them on the nature, the modalities and the objectives of the present investigation and demonstrated them various tests so that they could have a mental picture of the various tests they were going to take part.

Data for the study was collected in two phases. In first phase, data was collected on 19 items from 100 male Judokas and in the second phase, data was collected on newly developed specific fitness test battery (Table 2) from 150 subjects, for constructing the norms.
Table 2

SPECIFIC FITNESS TEST BATTERY ITEMS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Test</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Medicine ball throw</td>
<td>Power</td>
</tr>
<tr>
<td>2.</td>
<td>One minute Uchikomi with O-goshi</td>
<td>Speed of movement</td>
</tr>
<tr>
<td>3.</td>
<td>Modified dips</td>
<td>Shoulder strength endurance</td>
</tr>
<tr>
<td>4.</td>
<td>Squat thrust for one and half minutes</td>
<td>Endurance</td>
</tr>
<tr>
<td>5.</td>
<td>Bridge-up test</td>
<td>Flexibility</td>
</tr>
<tr>
<td>6.</td>
<td>Modified sit-ups</td>
<td>Abdominal strength endurance</td>
</tr>
<tr>
<td>7.</td>
<td>Half squat with a partner of an equal body weight</td>
<td>Legs strength endurance</td>
</tr>
<tr>
<td>8.</td>
<td>Holding the legs in raised position</td>
<td>Lower abdominal strength endurance</td>
</tr>
</tbody>
</table>

Reliability of Data

Reliability of data depends upon the instrument reliability, tester competency, subjects reliability and reliability of test. The reliability of these items were established scientifically by using test-retest method.

Instrument’s Reliability

The stop watches, measuring tapes, medicine balls, flexo meter case etc. used in this study were calibrated and supplied by the leading firms and their reliability was ensured by the manufacturers. The material used were of the fine quality. The stop watches measuring 1/100th of a 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 Judoka with a specialization in Judo at graduate and post-graduate level and working as a Lecturer in Physical Education is quite well acquainted with the techniques of 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 coaches, who were trained and acquainted with the tests and testing procedures.

Tester's competency was evaluated by the test-retest method and consistency of results was obtained by Product Moment Method of correlation. The data was collected from 30 selected subjects through test-retest method. The test-retest scores for all the test items were then correlated and coefficient, thus obtained, has been presented in Table 2.
### Table 3

**RELIABILITY COEFFICIENT OF TEST-RETEST SCORES**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Test</th>
<th>Coefficient of Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pull-ups</td>
<td>0.80</td>
</tr>
<tr>
<td>2.</td>
<td>Modified dips</td>
<td>0.93</td>
</tr>
<tr>
<td>3.</td>
<td>Modified sit-ups</td>
<td>0.84</td>
</tr>
<tr>
<td>4.</td>
<td>Raising and holding the legs &amp; upper body</td>
<td>0.87</td>
</tr>
<tr>
<td>5.</td>
<td>Holding the legs in raised position</td>
<td>0.92</td>
</tr>
<tr>
<td>6.</td>
<td>Half squat with weight (maximum capacity)</td>
<td>0.89</td>
</tr>
<tr>
<td>7.</td>
<td>Half squat with partner of an equal body weight</td>
<td>0.88</td>
</tr>
<tr>
<td>8.</td>
<td>30 Metre Run</td>
<td>0.90</td>
</tr>
<tr>
<td>9.</td>
<td>50 Metre Run</td>
<td>0.82</td>
</tr>
<tr>
<td>10.</td>
<td>Uchikomi with Seoi Nage</td>
<td>0.96</td>
</tr>
<tr>
<td>11.</td>
<td>Uchikomi with O-goshi</td>
<td>0.89</td>
</tr>
<tr>
<td>12.</td>
<td>Squat thrust for 1 minute</td>
<td>0.86</td>
</tr>
<tr>
<td>13.</td>
<td>Squat thrust for 1 ½ minutes</td>
<td>0.84</td>
</tr>
<tr>
<td>14.</td>
<td>3 Minutes run / walk</td>
<td>0.93</td>
</tr>
<tr>
<td>15.</td>
<td>Bridge-up test</td>
<td>0.85</td>
</tr>
<tr>
<td>16.</td>
<td>Modified sit and reach test</td>
<td>0.86</td>
</tr>
<tr>
<td>17.</td>
<td>Extent flexibility</td>
<td>0.91</td>
</tr>
<tr>
<td>18.</td>
<td>Standing broad jump</td>
<td>0.92</td>
</tr>
<tr>
<td>19.</td>
<td>Medicine ball throw</td>
<td>0.85</td>
</tr>
</tbody>
</table>

It may be observed from Table 2 that the data pertaining to different tests were quite reliable and the test further indicated that the testing reliability was significantly high (reliability coefficient ranging from 0.80 to 0.96), which ensured the competency of the tester to administer the test.
Subject Reliability

The test-retest coefficient of correlation also established the subject reliability, because the same subjects were used under similar conditions by the same tester and no motivational techniques were used.

Administration of Tests

The help of qualified Judo coaches and experts of physical education were taken by the scholar to administer the tests on the subjects. The scholar took special care to explain the tests and the testing procedure to the helpers and the subjects. The subjects were directed to come in proper playing kit during the performance of the tests. No motivational techniques were used to enhance their performance. However, each subject performed each test items enthusiastically with the spirit of competition and to know their standard of physical fitness.

Pull-ups

In the manner described below, each subject performed as many pull-ups as he could possibly do on a horizontal bar of such a height that the feet of the tallest judoka did not touch the floor while performing the test.

While taking the pull-up test the judoka hung on the bar with an over hand grip and performed the chin-ups himself as many times as he could (Fig. 3.1). In executing the movement, he pulled himself up until his chin
Fig. 3.1 PULL UP’S
was brought over the level of the bar and then lowered himself until the elbows were fully extended. He was not permitted to either kick his legs or to take any swing or jerk with the body to take any mechanical advantage. The number of completed pull-ups were recorded as the score of shoulder girdle strength.

**Modified Dips**

The subject was asked to take dip position with the partner holding, his both ankles and lifting up to a height of around three feet. From this position, on the command ‘start’, the subject flexed the elbows in order to lower his chest close to the ground with the entire body-weight on his hands (Fig. 3.2). He, then extended the elbows in order to regain the starting position. This was scored as one. This process was continued to the maximum till the subject got tired completely. Dip was considered complete when the arms were fully extended while taking the body up. Merely bending of the elbows was not counted as ‘Dip Scoring’.

**Modified Sit-ups**

Each subject were asked to do as many number of bent knee sit-ups as he could perform in a minute, in a manner described as under:

The Judo ka assumed a supine position, knees bent at an angle of about 90° with hands clasped behind he neck. The Judo ka raised his chest bringing the head forward towards his knees in order to touch the chest on
Fig. 3.2  MODIFIED DIPS
MODIFIED

Fig. 3.3 SIT-UP'S TEST
the thighs with a curl-up motion, and then returned to the starting position (Fig. 3.3).

The number of completed sit-ups to the nearest whole number was recorded as the score of upper abdominal strength.

**Raising and Holding the Legs and Upper Body**

In this test, subject was asked to lie down on the mat in supine position. On the command 'ready, start', subject raised his upper body and legs above the mat with the watch starting.

The moment subject dropped his chest on the legs, the watch was stopped. Time was measured to 1/10 of a second.

**Holding the Legs in Raised Position**

Subjects were asked to lie down on the mat. Scorer with a stopwatch was made to record the time standing nearer to him. On the word of command 'ready' and 'start' the watch was started and the subject had to raise his both the legs just one feet above from the mat, keeping the knees straight. The moment subject dropped the legs, the watch was stopped. Time was recorded to 1/10 of a second (Fig. 3.4).

**Half Squat with Partner of an Equal Body Weight**

The subject was asked to carry the partner on his shoulder, equal to his body weight and perform half squat. The subject was asked to choose
Fig. 34. Holding the legs in raised position.
Fig. 3.5 HALF SQUAT WITH EQUAL BODY WEIGHT PARTNER

The subject was asked to stand on a platform of equal height as the subject on the
platform and perform half squats. The subject performed half squats for the subject. The subject
performed half squats for the subject.

Very parallel lines, 30 cm apart, were marked
down the platform. The subject was asked to step
onto the platform at the front of the lines. The
limbs were then positioned behind the starting
line. The subject then moved forward, keeping the
limbs in line with the body. As the subject moved
forward, the limbs were extended, and the
subject kept in line with the finish line. The
subject's knees were kept as straight as possible, and
the subject kept in line with the finish line.
the partner almost similar to his own body weight. On the command ‘ready’ the partner sat over the shoulder of the subject. The partner will sit on the shoulders with the legs hanging on either side of the neck of the subject. The subject, stood straight on the feet. For the support needed and better balance, they were allowed to stand nearer to the wall. On the command ‘start’ the subject had to perform a half squat. Final score was the total number of half squats performed by the subjects in one attempt (Fig. 3.5).

**Half Squat with Weight (Maximum Capacity)**

The subject was asked to lift maximum weight as he could on his shoulder and performed half squat once presented in figure 3.6. Half squat performed by the subject in one duration showed his maximum strength.

**30 Meters Run**

Two parallel lines, 30 meters apart from each other, were marked. The subjects were asked to take a standing start from behind the starting line. The clapper was clapped after a 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 stopwatches. The subjects sprinted as fast as possible, towards the finish line (Fig. 3.7).
Fig. 3.6

HALF SQUAT WITH WEIGHT
Fig. 3.7 30-METRES RUN

Start Line ————> 30Metres ————> Finish Line
The elapsed time, from the starting signal until the subject crossed the finish line was recorded to the nearest 1/10 of a second as the score.

**50 Meters Run**

Two parallel lines 50 meters apart from each other were marked. The subjects were asked to take a standing start from behind the starting line, when the clapper was clapped after the caution ‘ready’ was given. The starter stood in such a position, so that the ‘V’ of the clapper (open before clap) was visible to the timekeepers (Fig. 3.8). As the ‘V’ closed, when the clap was executed, the time keepers at the finish line started their stopwatches. The subjects sprinted as fast as possible across the finish line and the stopwatches were stopped, as and when the concerned subjects covered the distance. The timing of the 50 meters run was taken with same procedure explained in the 30 meters run. The elapsed time was recorded to the nearest 1/10 of a second as the score.

**Uchikomi with Seoi-Nage**

The subjects performed Uchikomi with Seoi-Nage technique (Shoulder throw) against a dummy partner. The Judoka performed maximum number of Uchikomi in one minute recorded as the score.
Fig. 3.8  50-METRES RUN
Uchikomi with O-goshi

The Judoka performed Uchikomi with O-goshi technique (Hip throw) against a dummy partner. The maximum number of turns in one minute was recorded as the score.

Squat Thrust (One and Half Minutes)

The subject adopted a standing position, to start the exercise, the command was given 'Ready' and 'Go' and for discontinuing the exercise the command was 'stop'. The exercise was performed for a duration of 90 seconds for as many times as possible by adopting correct positions as mentioned: (i) Bent at the knee and waist and place the hands on the ground in front of the feet, (ii) Thrust the legs backward to obtain a dip position, (iii) Return to squat position, and (iv) Stand erect (Fig. 3.9).

This whole process was count one. The exercise was repeated as many times as possible for a duration of 90 seconds. The tester recorded the time and the assistant counted the number of exercises performed by the subject.

The number of correct exercises executed during the 90 seconds was the score of the subject.

Three Minute Run / Walk

Subjects were selected at random were instructed to run / walk continuously for three minutes on a 400 meters track. Each runner was
Fig. 3.9  BURPEE TEST

1. Standing posture
2. Bending forward
3. Push-up position
4. Returning to standing
Fig. 3.10

THREE MINUTES RUN

START LINE
assigned an observer to record the distance covered by each subject (Fig. 3.10). Scoring was done according to the distance covered by the runners in meters.

**Bridge-up Test**

The subject assumed supine position on the floor and raised his body to make an arch. While making an arch, the hands and feet were brought as close to each other, as possible (Fig. 3.11).

The tester, who took up his position on one side of the subject, placed zero end of the yard stick on the floor and slid the flexomeasure case vertically upward until the ruler guide touched the highest point of the subject's arched spine. The reading (to the nearest quarter of an inch) was recorded in the case of window at the lower (C-D) line. The best score (to the nearest quarter of an inch) of the three trials was recorded.

**Modified Sit and Reach Test**

A yardstick was taken and its 15 inch mark was aligned with a line drawn on the floor. A yardstick was taped on the floor. The subject was instructed to sit down and to align his heels with the nearer edge of the 15 inch mark. He was asked to slide back his seat beyond the zero mark of the yardstick. One assistant stood and braced his toes against the heels of the subject (Fig. 3.12). As the subject got ready to stretch, two assistants held the knees of the subject in a locked position, on either side of him. The
Fig. 3.11 BRIDGE-UP-TEST
Fig. 3-12 MODIFIED SIT-AND-REACH TEST

1. SUBJECT

2. SUBJECT

TESTER
subject was asked to slowly stretch forward with heels not more than 5 inches apart, and to touch the yard stick with the fingertips of hands as much down as possible.

The best of three trials measured to the nearest quarter of an inch was taken as the test score of the subject.

**Extent Flexibility**

A measuring scale, 75 centimetre long, was drawn on a wall and was marked off in one centimetre intervals from 0 – 75 centimetres. The scale was wide enough to suit the subjects of different heights. Another line, perpendicular to the wall and in line with 30 centimetres marked on the scale was drawn on the floor as given in Figure 3.13.

The subject to be tested was asked to stand with his left side towards the wall, his toes touching this line, feet together and perpendicular to the line marked on the door. The subject stood at an arms length from the wall so that he could just touch the wall, with his left fist when his arm was held horizontal from the shoulder.

The subject was then asked to extend his right arm straight at shoulder height, keeping his both feet together and at the line. He was asked to keep his palm down, fingers together and extended. He was then asked to twist clockwise (around his back) as far as possible, so that, he could touch the scale marked on the wall with his right hand. During this
Fig. 3.13  EXTENT FLEXIBILITY TEST

RIGHT HANDERS

LEFT HANDERS
movement, the tester helped the subject to keep his feet in place by supporting his feet so that it was not shifted.

Each student was given one trial to get a feel of the test. If he committed any errors, they were corrected by the tester. His second try was counted and recorded as his score. The farthest point reached (in centimetres) on the scale and held for at least two seconds was the score of the subject.

**Medicine Ball Throw (Six Pound)**

The subject was asked to stand as close to the throwing line as possible and to take a comfortable throwing position. After taking the throwing position, he was instructed to throw the medicine ball backward, as far as he could, with both the hands. The throw was initiated from a stationary standing position and was made over the head (Fig. 3.14). Best of the three trials was measured in metres as the score for this test.

**Standing Broad Jump**

A take off line was drawn near one edge of a jumping pit. The subject was asked to take his position with toes just behind the take-off line, with feet slightly apart. Taking off from both feet simultaneously, he jumped to cover maximum possible horizontal distance, landing on both feet. While jumping, he crouched slightly and swinging the arms to aid the jump. Three trials were given to him, the best among the three trails was credited to his score (Fig. 3.15).
Fig 3.14 SIX POUND MEDICINE BALL THROW TEST

Fig 3.15 STANDING BROAD JUMP

DISTANCE TO BE MEASURED

SUBJECT
Fig. 3.15 STANDING BROAD JUMP
The horizontal distance between the take-off line and the nearest break made in the landing pit was measured. The distance measured, in metres, was recorded as the score, for explosive power of legs.

**Statistical Procedure**

The main purpose of this investigation was to construct the specific fitness test battery and development of norms for the Intervarsity level Judokas.

Factor analysis technique was used as an instrument to select the test items out of nineteen variables, best suited to measure the specific fitness of the Judokas.

The correlation matrix of the inter-correlation between the 19 variables was obtained by applying Pearson's Product Movement Method. The factor analysis technique was applied by using the principal component analysis (unrotated factor loadings and varimax rotation). Final solution so obtain was used to identify the different factors. These factors were given an appropriate name depending upon the characteristics of variables contained in it. Finally, a fitness test battery was prepared by picking up variables having the highest loading from each factor. Finally, for developing the norms the T-scale and Hull scale were used.