Chapter - III

PROCEDURE

In this chapter selection of subjects, selection of variables, selection of tests/questionnaires, administration of questionnaire, collection of data, reliability of data, administration of tests and statistical technique for the analysis of data have been described.

SELECTION OF SUBJECTS

The subjects for this study were selected from various Indian Universities and State which participated in all India Inter-varsity (in the year 1998-99) and Junior National Judo Championship (in the year 1997-98). A total of one hundred and sixty Judokas, ten from each of the eight weight categories, from two age groups i.e. seniors and juniors were selected. The age of the subjects for seniors was ranging from 18 to 25 years, for Juniors from 14 to 18 years.
The following weight categories were adopted:

**Senior Weight Categories**

a) Below and including 50 kg weight category.
b) Above 50 kg and upto 55 kg weight category.
c) Above 55 kg and upto 60 kg weight category.
d) Above 60 kg and upto 65 kg weight category.
e) Above 65 kg and upto 71 kg weight category.
f) Above 71 kg and upto 78 kg weight category.
g) Above 78 kg and upto 86 kg weight category.
h) Open weight category.

**Junior Weight Categories**

a) Below and including 40 kg weight category.
b) Above 40 including 45 kg weight category.
c) Above 45 including 50 kg weight category.
d) Above 50 including 55 kg weight category.
e) Above 55 including 60 kg weight category.
f) Above 60 including 65 kg weight category.
g) Above 65 including 71 kg weight category.

h) Above 71 kg weight category.

SELECTION OF VARIABLES FOR PSYCHOLOGICAL AND PHYSIOLOGICAL PROFILES

In this study care was taken to pinpoint the variables for psychological and physiological profiles which were not only relevant but also closely related to the purpose of this study. Therefore, based on literary evidence, correspondence with the experts and scholars' own understanding, the following variables were selected for the purpose of this study.

(a) Physiological variables

1. Anaerobic Power

2. Resting Heart Rate

3. Resting Respiratory Rate

4. Vital Capacity

5. Body composition:
- Total Body Fat Percentage
- Lean Body Weight

6. Breath Holding Capacity
- Positive Breath Holding Capacity
- Negative Breath Holding Capacity

(b) Psychological variables

1. Incentive Motivation (consisting of seven items)
   - Excellence, Power, Sensation, Independence, Success, Aggression, Affiliation

2. Achievement Motivation

3. State and Trait Anxiety

4. Sports Competition Anxiety

**SELECTION OF TESTS / QUESTIONNAIRES**

The tests used in this study for the collection of data were selected because they were found to be most reliable and have been widely used very often in the
profession of physical education and sports throughout the world. The reliability quotients as given in the manuals of respective tests are as under:
TABLE- 1

RELIABILITY QUOTIENT OF VARIOUS TESTS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Variables</th>
<th>Test</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Incentive Motivation</td>
<td>Incentive Motivation Inventory (IMI)&lt;sup&gt;1&lt;/sup&gt;</td>
<td>.27 to .67</td>
</tr>
<tr>
<td>2.</td>
<td>Achievement Motivation</td>
<td>Sports Achievement Motivation Test (SAMT)&lt;sup&gt;2&lt;/sup&gt;</td>
<td>.70</td>
</tr>
<tr>
<td>3.</td>
<td>State Anxiety</td>
<td>Self Evaluation Questionnaire (STAI)&lt;sup&gt;3&lt;/sup&gt;</td>
<td>.93</td>
</tr>
<tr>
<td>4.</td>
<td>Trait Anxiety</td>
<td>Self Evaluation Questionnaire (STAI)&lt;sup&gt;4&lt;/sup&gt;</td>
<td>.92</td>
</tr>
<tr>
<td>5.</td>
<td>Sports Competition Anxiety</td>
<td>Sport Competition Anxiety Test (SCAT)&lt;sup&gt;5&lt;/sup&gt;</td>
<td>.85</td>
</tr>
</tbody>
</table>

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4 Ibid.

5 Martens *Sports Competition Anxiety Test* pp. 89-97.
ADMINISTRATION OF QUESTIONNAIRE AND COLLECTION OF DATA

The coaches and subjects were consulted personally and their sincere cooperation was solicited. Respondents were called to a common place when they were not busy and had enough time to spare for testing. Necessary instructions were passed on to the subjects before the administration of each test. The research scholar motivated the student respondents by promising to send a separate abstract of the conclusions of his study to each of the subjects. Confidentiality of responses was guaranteed so that the subject would not camouflage their real feelings. No time limit for filling in the questionnaire was set but the subjects were made to respond as quickly as possible once the instructions are clearly understood by them. As soon as a group of players completed one questionnaire, the another was given to them after a short interval.

INCENTIVE MOTIVATION INVENTORY

It is a test of a player’s strength of attraction for incentive operating within goal oriented situations. Incentive competition motivation provides information on
the athletes major reason for participating in particular sports. Motivation to participate in competitive sport was classified into seven major incentive system, viz. excellence (Ex), power (PO), sensation (SE), independence (Ind.), prestige (PR) aggression (Agg) and affiliation (Aff). A modified version of these incentive system was by Alderman and Wood to examine the more specific motivation of athletes. The incentive motivation inventory was an instrument perfording to evaluate the incentives perceived by young athletes as being available and attractive to them through competition sports participation.

The inventory contains 70 items. These question statements are evenly spread over the seven incentive system i.e. there are ten question statements for each system. The subjects respond using a four point ordinal scale. Response inventory for each item varies from 1 (ever) to 4 (always) in order to ascendency of the feeling. Hence the maximum response score from the total inventory is 280 minimum 70 and in case of each system the response score ranges from 7 to 40.

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The normative response intervals for each of the systems are given below:

0 - 18  Low
18 - 22  Below average
22 - 28  Average
28 - 32  Above average
32 - 40  High

The treatment of data emanating from the administration of IMI was done accordance with the instructions of the author and objectives of the study.

**SPORTS ACHIEVEMENT MOTIVATION TEST**

Achievement motivation is an athletes pre-disposition to approach or avoid a competitive situation.
The sports achievement motivation test\(^7\) is a self evaluation questionnaire of twenty statements responses value of which extends from 0 to 40 in total. Each statement carries a maximum score of two and minimum zero. When the subjects ticked the high pole part he has given two points and when he touched to low place he earned zero.

After conducting further studies by using SAMT the author has given the following classification criteria based on percent and points.

<table>
<thead>
<tr>
<th>Raw / Mean Score</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 24</td>
<td>Low</td>
</tr>
<tr>
<td>24-30</td>
<td>Moderate</td>
</tr>
<tr>
<td>30 and above</td>
<td>High</td>
</tr>
</tbody>
</table>

The treatment of the data obtained from the administration of SMAT to the subjects was done in the light of the instructions contained in the test.

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STATE AND TRAIT ANXIETY INVENTORY (STAI)

Spilberger along with Gorsuch and Lushane\textsuperscript{8} developed a test of state - trait anxiety to measure a person's level of anxiety in specific situations which might fluctuate from one movement to the next and a test of a person's level of anxiety or a more permanent basis as indicated by personality trait.

The test is self-evaluation questionnaire and comprises of two forms i.e $Y^1$ and $Y^2$ the former being a measure of situational anxiety and the later that of trait anxiety.

In responding to the STAI anxiety scale examinees blacken the number on the standard test form to the right of each ten statement that best describe the intensity of their feelings: 1) not at all 2) some what 3) moderately so 4) very much so. In responding to the T-anxiety scale examinees are instructed to indicate how they generally feel by rating the frequency of their feelings of anxiety on the following four point scale:

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\textsuperscript{8} Spilberger Gorsuch an Lushana \textit{STAI Manual for the State Trait Anxiety Inventory} pp. 4-7.
1) almost never, 2) some times, 3) often, 4) almost always.

The questionnaire contains a number of statements from 1 to 20 are related to state-anxiety and indicate how one feels right now, that is, at this moment. The statements from 20 to 40 access the level of trait anxiety and indicate how a person generally feels.

Each STAI item is given a weighted score of 1 to 4. A rating of 4 indicates the presence of a high level of anxiety for ten state anxiety items and eleven trait anxiety items e.g. "I feel frightened", "I feel upset". A high rating indicates the absence of anxiety for the remaining ten state anxiety items and nine trait anxiety items i.e. "I feel calm", "I feel relaxed". The scoring weights for the anxiety present items are the same as the blackened numbers on the test form. The scoring weights for the anxiety absent items are reserved i.e. responses marked 1, 2, 3, 4 are score 4, 3, 2 or 1 respectively. The anxiety absent items for which the scoring weights are reversed on the state anxiety trait anxiety scales are:

State Anxiety- 1, 2, 5, 8, 10, 11, 15, 16, 19 and 20.

Trait Anxiety- 21, 23, 26, 27, 30, 33, 34, 36 and 39.
To obtain scores for the state anxiety and trait anxiety scales, simply add the weighted scores for the inventory items that make up each scale taking in the account the fact that the scores are reversed for the above items. Scores for both the state-anxiety and trait-anxiety scales can very from minimum of 20 to a maximum of 80.

**SPORTS COMPETITION ANXIETY TEST**

The sport competition anxiety test is latest and most popular sport specific anxiety test whose purpose, as claimed by the authors is to assess individual differences in competitive trait anxiety or the tendency to purpose competition situations on threatening and/or to respond to these situations with elevated state anxiety.

The sport competition anxiety test (SCAT) contains fifteen items. Subjects are asked to indicate how they generally feel when they compete in sports and games, and respond to each item using a three point ordinal scale (Hardly ever, Sometimes, or often). Ten of the items assess individual difference in competitive
trait anxiety proveness, five spurious items are also included to reduce possible responses bias. Total scores of the SCAT range from 10 (low competitive trait anxiety) to 30 (high competitive trait anxiety).

The ten items are 2,3,5,6,8,9,11,13, 14 and 15. The spurious items: 1,4,7,10 and 13 are not scored. Items 2,3,5,8,9,12,14 and 15 are worded so that they are scored according to following key:

1- Hardly ever       = 1
2- Some times        = 2
3- Often             = 3

Items 6 and 11 are scored according to following key:

1- Often             = 1
2- Some times        = 2
3- Hardly ever       = 3
If a person deletes one of the ten test items, prorated full scale score can be obtained by computing the mean score for the nine items answered multiply this value by ten and rounding the product to the next whole numbers. When two or more numbers are omitted, the respondents questionnaire should be invalidated. For ease, in hand scoring template was made.

Reliability of Data

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

Instrument 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 session in the testing procedure under the guidance of the expert.

Tester competency was also evaluated together by reliability of tests.

Reliability of Tests

Reliability of tests were 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.
<table>
<thead>
<tr>
<th>Tests</th>
<th>Below 50 Kg</th>
<th>Below 55 Kg</th>
<th>Below 60 Kg</th>
<th>Below 65 Kg</th>
<th>Below 71 Kg</th>
<th>Below 78 Kg</th>
<th>Below 86 Kg</th>
<th>Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaerobic Power</td>
<td>.86*</td>
<td>.90*</td>
<td>.87*</td>
<td>.96*</td>
<td>.92*</td>
<td>.92*</td>
<td>.95*</td>
<td>.94*</td>
</tr>
<tr>
<td>Resting Heart Rate</td>
<td>.91*</td>
<td>.86*</td>
<td>.87*</td>
<td>.85*</td>
<td>.87*</td>
<td>.90*</td>
<td>.92*</td>
<td>.86*</td>
</tr>
<tr>
<td>Resting Respiratory Rate</td>
<td>.92*</td>
<td>.87*</td>
<td>.92*</td>
<td>.87*</td>
<td>.85*</td>
<td>.92*</td>
<td>.92*</td>
<td>.89*</td>
</tr>
<tr>
<td>Vital Capacity</td>
<td>.95*</td>
<td>.89*</td>
<td>.95*</td>
<td>.92*</td>
<td>.96*</td>
<td>.86*</td>
<td>.90*</td>
<td>.88*</td>
</tr>
<tr>
<td>Total body fat percentage</td>
<td>.89*</td>
<td>.95*</td>
<td>.90*</td>
<td>.89*</td>
<td>.86*</td>
<td>.88*</td>
<td>.91*</td>
<td>.90*</td>
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<tr>
<td>Lean body weight</td>
<td>.87*</td>
<td>.92*</td>
<td>.89*</td>
<td>.90*</td>
<td>.85*</td>
<td>.90*</td>
<td>.91*</td>
<td>.94*</td>
</tr>
<tr>
<td>Positive Breath holding</td>
<td>.86*</td>
<td>.91*</td>
<td>.87*</td>
<td>.87*</td>
<td>.92*</td>
<td>.92*</td>
<td>.89*</td>
<td>.93*</td>
</tr>
<tr>
<td>capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Breath holding</td>
<td>.90*</td>
<td>.86*</td>
<td>.88*</td>
<td>.85*</td>
<td>.90*</td>
<td>.95*</td>
<td>.87*</td>
<td>.88*</td>
</tr>
<tr>
<td>capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at 0.01 level of confidence
N = 10
r_{01} (8) = .765
TABLE - 3

RELIABILITY COEFFICIENT OF TEST-RETEST SCORES

(JUNIORS)

<table>
<thead>
<tr>
<th>Tests</th>
<th>BELOW 50 KG</th>
<th>BELOW 55 KG</th>
<th>BELOW 60 KG</th>
<th>BELOW 65 KG</th>
<th>BELOW 71 KG</th>
<th>BELOW 78 KG</th>
<th>BELOW 86 KG</th>
<th>OPEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaerobic Power</td>
<td>.86*</td>
<td>.90*</td>
<td>.86*</td>
<td>.92*</td>
<td>.89*</td>
<td>.92*</td>
<td>.92*</td>
<td>.89*</td>
</tr>
<tr>
<td>Resting Heart Rate</td>
<td>.92*</td>
<td>.91*</td>
<td>.94*</td>
<td>.90*</td>
<td>.90*</td>
<td>.87*</td>
<td>.92*</td>
<td>.88*</td>
</tr>
<tr>
<td>Resting Respiratory Rate</td>
<td>.89*</td>
<td>.92*</td>
<td>.92*</td>
<td>.91*</td>
<td>.88*</td>
<td>.89*</td>
<td>.90*</td>
<td>.93*</td>
</tr>
<tr>
<td>Vital Capacity</td>
<td>.88*</td>
<td>.87*</td>
<td>.93*</td>
<td>.89*</td>
<td>.88*</td>
<td>.91*</td>
<td>.89*</td>
<td>.92*</td>
</tr>
<tr>
<td>Total body fat percentage</td>
<td>.92*</td>
<td>.88*</td>
<td>.87*</td>
<td>.89*</td>
<td>.87*</td>
<td>.90*</td>
<td>.91*</td>
<td>.90*</td>
</tr>
<tr>
<td>Lean body weight</td>
<td>.95*</td>
<td>.89*</td>
<td>.89*</td>
<td>.90*</td>
<td>.86*</td>
<td>.93*</td>
<td>.94*</td>
<td>.88*</td>
</tr>
<tr>
<td>Positive Breath holding</td>
<td>.90*</td>
<td>.92*</td>
<td>.88*</td>
<td>.93*</td>
<td>.88*</td>
<td>.90*</td>
<td>.94*</td>
<td>.88*</td>
</tr>
<tr>
<td>capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Breath holding</td>
<td>.92</td>
<td>.95*</td>
<td>.96*</td>
<td>.91*</td>
<td>.91*</td>
<td>.88*</td>
<td>.91*</td>
<td>.97*</td>
</tr>
<tr>
<td>capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at 0.01 level of confidence
N= 10
r_{01}(8) = .765
The obtained correlation have been shown in Table 2 & 3.

Since very high correlation from .84 to .96 were obtained, investigator’s competency to administer the tests as well as reliability of tests were established.

From the Table 2 and 3 it is evident that tester reliability was significantly high. This established competency of scholar to administer the 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 was given.
ADMINISTRATION OF TESTS

ANAEROBIC POWER

Objective: To measure anaerobic power.

Procedure: The anaerobic power was calculated in kg-m./sec from Sargent Jump Test in which by the help of vertical jump and body weight, the anaerobic power was calculated by using Lewis Nomogram.

The score of vertical jump was obtained in meters by measuring the difference between a Person's Standing reach and the height to which he can jump and touch. The body weight was recorded in kilograms.

To obtain a score of anaerobic power, a straightedged was laid across the Lewis Nomogram connecting the scores of the distance of jump and reach test and
Fig. 1 -

The Lewis Nomogram for determining Anaerobic Power from Jump-Reach score and body weight.
body weight. Where the straightedge intersected the middle scale was the anaerobic power.\textsuperscript{9}

**RESTING HEART RATE**

**Objective:** To measure resting heart rate.

**Procedure:** The resting heart rate of each of the subject was recorded between 6.00 and 8.00 am. Before recording the resting heart rate, the subjects were instructed to remain lying on their beds. To record the heart rate, the pulse was palpated at the radial artery for one full minute. The score was expressed in terms of number of pulse beats per minute.

RESTING RESPIRATORY RATE

Objective: To measure resting respiratory rate.

Procedure: The resting respiratory rate of each of the subject was recorded between 6.00 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 his rate of respiration in unit counts per minute by carefully watching the movements of subjects abdomen. The total number of respiratory movements per minute was final score.

VITAL CAPACITY

Objective: To measure vital capacity.

Procedure: Vital capacity was measured in ml. by using dry spirometer. The spirometer was brought in to zero position. The subject performed maximum inspiration and after closing the nose, the air was blown as intensely as possible in
the mouth piece. Then the amount of expired air was read directly from the calibrated scale and that was the score of vital capacity.\textsuperscript{10}

**TOTAL BODY FAT PERCENTAGE**

**Objective:** To measure total body fat percentage.

**Procedure:** Total body fat percentage was calculated from two skin folds (thigh and subscapular) by using Sloan - Weir Nomogram.

Thigh skin fold was taken from a vertical skinfold in the anterior midline of the thigh, halfway between the inguinal ligament. Subscapular skinfold was running downward and laterally in the mutual fold of the skin from the inferior angle of the scapular.

Fig. 2 - Sloen-Weir Nomogram for prediction of total body fat percentage from skinfolds measurement (Sub Scapula and Thigh)
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.\textsuperscript{11}

**LEAN BODY WEIGHT (Fat Free Weight)**

**Objective:** To measure lean body weight (Fat Free Weight)

**Procedure:** The lean body weight was calculated by subtracting the fat weight of the subjects from their total body weight.\textsuperscript{12}

\textsuperscript{11} Fox, Bowers and Foss, *The Physiological Basis of Physical Education and Athletics*, p. 566.

POSITIVE BREATH HOLDING CAPACITY

Objective: To measure positive breath holding capacity.

Procedure: To measure the positive breath holding capacity, the subjects were instructed to place the nose clip tightly. They will be asked to inhale through the mouth to the maximum capacity.

As soon as the subjects took a deep breath to the fullest capacity of their lungs and close the lips, the stop watch was started.

As soon as the subjects opened their lips to exhale, the stop watch was stopped and the time given by the watch was recorded as the score of positive breath holding capacity.
NEGATIVE BREATH HOLDING CAPACITY

Objective: To measure negative breath holding capacity.

Procedure: To measure the negative breath holding capacity, the subjects were instructed to place the nose clip tightly. They were asked to exhale through the mouth to the maximum capacity.

As soon as the subjects exhale and close the lips, the stop watch was started.

As soon as the subjects open their lips to inhale, the stop watch was stopped and the time given by the watch was recorded as the score of the negative breath holding capacity.
STATISTICAL TECHNIQUES EMPLOYED FOR
THE ANALYSIS OF DATA

To characterize elite Indian Judokas by their selected Psychological and Physiological responses to standard human performance measures, the mean and standard deviation were used. To examine significant differences in different weight categories, analysis of variance was applied at .05 level of confidence. To examine the significant difference in two age groups (Juniors and Seniors) t-ratio was applied at .05 level of confidence.

Mean, standard-deviation, T-ratio were calculated by using Microsoft Excel Software.

Second type i.e. two sample equal variance (homoscedastic) with two tailed distribution t-test was computed among seniors and juniors.

Analysis of variance (ANOVA) table was formulated by ANOVA programme in PASCAL LANAUGAGE.