

Chapter III

METHODOLOGY

This chapter described the methodology and adopted procedure precisely, selection of subjects, selection variables, experimental design, reliability of data, orientation of subjects, training programme, administration of tests and statistical procedure employed for analysis of data.

3.1 Selection of Subjects

The purpose of the study was to find out the effect of talent identification programme and developmental training on selected motor fitness and performance variables of track and field events in school boys. To achieve the purpose of the study 156 school boys were selected randomly, from Tisaiyanvillai, Tirunelveli (Dt). They were in the age group of 12 to 14 years. They participated in the research voluntarily and cheerfully without any compulsion. The selected students (156), who secured more than 50 % marks in the world talent beaters test were considered as subjects. They were doing special developmental programme regularly given by the physical education teachers.

3.2 Selection of the Variables

In the present study, the investigator collected many theories and literatures related to the talent identification programme, anaerobic training and track and field performance, overview for various articles in the selected field and discussed with the expert in the field of physical education the following variables were selected.

Independent Variables

1. Talent Identification Programme
2. Anaerobic training

Dependent Variables

a) Motor Fitness Variables

- i) Muscular strength
- ii) Muscular Endurance

- iii) Speed
- iv) Explosive power
- v) Cardio-respiratory Endurance
- vi) Flexibility
- vii) Coordination

b) Performance Variables in Track & Field Event

- i. 100m sprint
- ii. Long jump
- iii. Shot put.

3.3 Experimental Design

For the purpose of the study 156 boys were selected randomly, from Tisaiyanvillai, Tirunelveli (Dt). They were in the age group of 12 to 14 years. The selected students underwent the talent identification programme and they were divided into two equal groups named as group A and group B (Group A=Group B=78 each). From the group A, thirty (15 - Sprint & jumping talents, 15 - throwing talents) students were selected on the basis of talent screening test and they acted as the experimental group. Similarly thirty (15-Sprint & jumping talents, 15-throwing talents) students were selected from the group B, who acted as the control group. They participated in the research voluntarily and cheerfully without any compulsion.

Method for Identifying Talented Children

The raw scores of the somatotypes and motor fitness test were tested normality and further converted into standard scores (T-Scores). The T-Scores values of all tests were presented in appendices. The T scores are normally ranged between 20 and 80. A score of 50 represents the mean. A difference of 10 from the mean indicates a difference of one standard deviation. Thus, a score of 60 is one standard deviation above the mean, while a score of 40 is one standard deviations below the mean. The T- Scores were described on the basis of mean and standard deviation of whole sample (<http://learningdisabilities.about.com/od/assessmentandtesting/qt/testscores.htm>).

T-Score = $50 + 10(X-M)/S.D$

X- Raw Scores

M-Mean

S.D-Standard Deviation

Range

73-80 = Very Superior

67-72 = Superior

60-68 =High Average

44-59 =Average

38-43 =Below Average

30-37 = Borderline

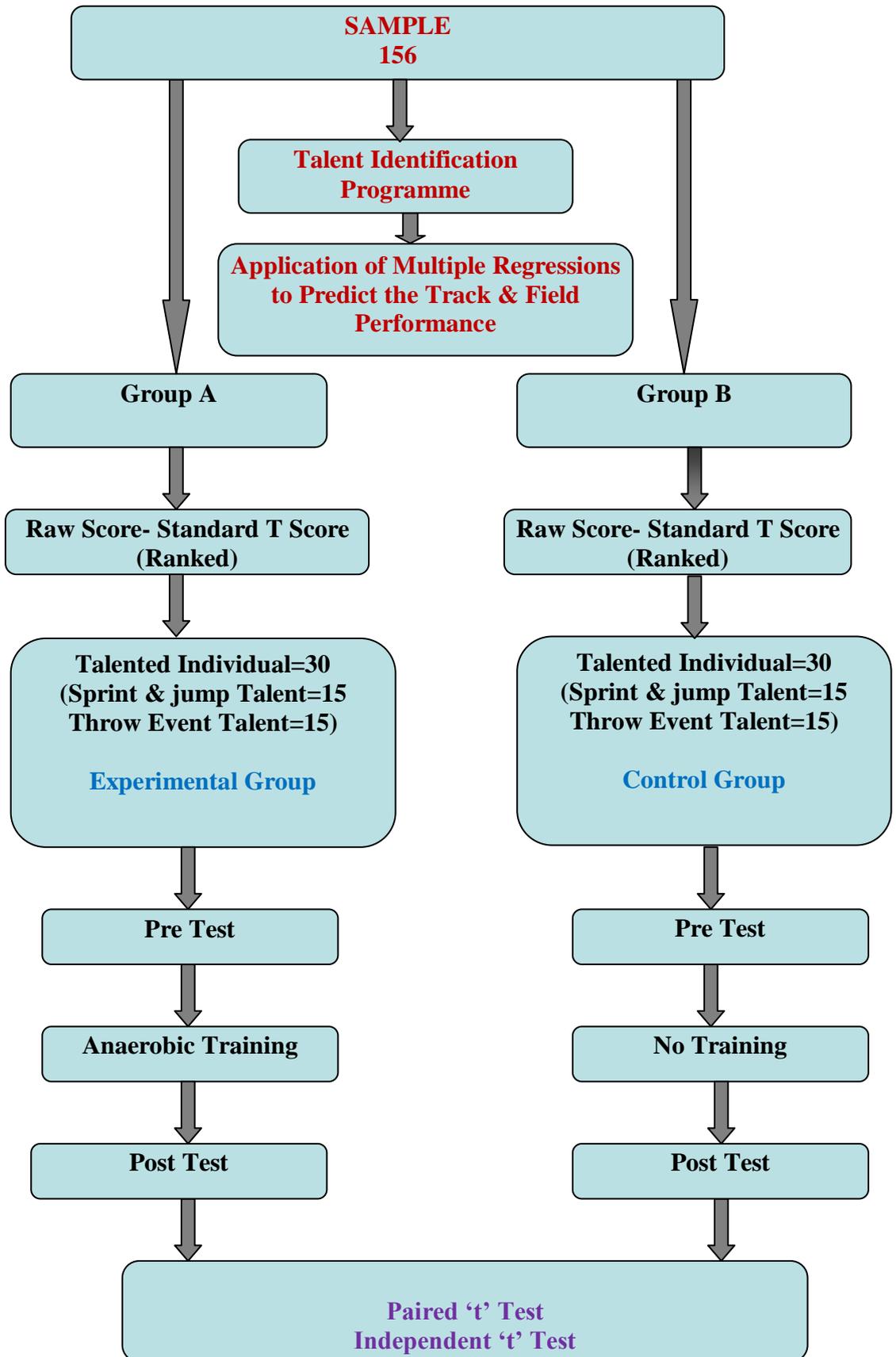
Below 30 = Low

The subject's raw scores of all talent screening tests (sprint & jump and Throw model) were converted to T-Scores, which were added and ranked. According to their percentage with respect to the sprint & jump and throw model, sixty (60) students (sub sample) were selected from the samples on the basis of rank.

After the selection process, the experimental group (selected talented students) was assigned to the developmental anaerobic training for a period of 12 weeks for 4 sessions per week (60 min/session). All the subjects tested prior and after the experimental treatment on selected motor fitness and performance variables in track and field events. The control group did not participate in any training programme rather than their daily physical education programme and routine work. The suitable statistical tools were applied to evaluate the talent identification programme and test the significance difference between pre and post test of experimental group and control group. The influence of the talent identification programme on selected motor fitness and performances in track and field event can be identified by using multiple regression analysis. The paired 't' test was applied to test the significance difference at 0.05 level of confidence between pre and post test scores of experimental group and control group. All statistical analyses were carried out with the help of statistical package SPSS.16 for windows.

FIGURE 3.1

DESIGN OF THE STUDY



Justification

Criteria for Selection of the Subjects

The samples were selected for this study, based on the development stage of 12-14 years to apply the talent identification program. The sample size can be constructed by using many theories, which ensure the reliability of prediction of performance. The sample (30) selected for the experiment, where the effective learning can be done.

Criteria for Selecting the Location

The most important aspect of research is to assess the influence of talent identification programme and training on selected criterion measures. The implementation of tests and training, the researcher needs enough time, space, cooperation from the organization, so the location fixed to ensure smooth functioning of the tests and training. Further there should be enough facilities for bathrooms, toilets, drinking water and rooms for giving instruction. For ensuring the developmental training, all the talents have been regularly practiced in the evening.

Reliability of Data

The reliability of data was ensured by establishing the instrument reliability, tester competency and reliability of the tests and subjects' reliability.

Reliability of Instruments

The researcher used standardized instruments from department of physical education and sports, Pondicherry University, which ensures the reliability of measurements. These instruments were supplied by the reputed scientific firms and the calibration and the calibration of the instruments were accepted as accurate enough for the purpose of the study.

Tester competency and Reliability of Tests and Subjects

To ensure uniformity and reliability of the testing technique, the investigator attended a training course and had a number of practice sessions in the testing procedures with the guidance of experts from kinanthropometry and physical education. All the measurements were taken by the investigator with proper guidance and the reliable results could be ensured. The test-retest indicated the reliability of the subjects, as the same tester used the same subjects under similar conditions. The intra-class coefficient of correlation was obtained from ten subjects are given in table 3.1.

Table 3.1
Intra-class Reliability Coefficients of Selected Variables

S.NO	VARIABLES	UNITS OF MEASUREMENTS	RELIABILTY (Coefficient of Correlation r)
1	Height	Centimeter (cm)	0.99*
2	Weight	Kilograms (kg)	0.99*
3	Triceps Skinfold	Millimeter (mm)	0.99*
4	Subscapular Skinfold	Millimeter (mm)	0.99*
5	Supraspinale Skinfold	Millimeter (mm)	0.99*
6	Medial Calf Skinfold	Millimeter (mm)	0.99*
7	Biepicondylar Breadth of Humerus	Centimeter (cm)	0.98*
8	Biepicondylar Breadth of Femur	Centimeter (cm)	0.98*
9	Upper Arm Girth	Centimeter (cm)	0.99*
10	Lower Limb Girth	Centimeter (cm)	0.98*
11	Muscular strength	N (1N=0.981 KP)	0.90*
12	Muscular Endurance	Count in Numbers	0.92*
13	Speed	Seconds (sec)	0.96*
14	Explosive Power (Vertical Jump)	Centimeter (cm)	0.91*
15	Cardio-respiratory Endurance	Seconds (sec)	0.86*

Table 3.1 (cont...)

Intra-class Reliability Coefficients of Selected Variables

S.NO	VARIABLES	UNITS OF MEASUREMENTS	RELIABILITY (Coefficient of Correlation r)
16	Flexibility	Centimeter (cm)	0.98*
17	Coordination	Seconds (sec)	0.90*
18	100m Sprint	Seconds (sec)	0.86*
19	Long Jump	Meters (m)	0.90*
20	Shot -Put	Meters (m)	0.92*
21	Standing Broad Jump	Meters (m)	0.96*
22	Standing Triple Jump	Meters (m)	0.91*
23	Five Consecutive Hops	Meters (m)	0.98*
24	Push-Ups	Meters (m)	0.96*
25	Shot Backward Throw	Meters (m)	0.90*

*Significant at 0.01 Level of Confidence

Required table value for 0.01 level of confidence with df 8= 0.765

Orientation to the Subjects

To make the subjects involve themselves in the selected tests and the anaerobic training programme, an orientation class was arranged. The researcher has explained the purpose of the study to the subjects and their part in the study. The subjects of all groups were sufficiently motivated to perform their maximal level during testing periods. The subjects involved in the anaerobic training programme were verbally motivated to attend the training sessions regularly.

3.4 Pilot Study

To know the practical difficulties in the administration of tests and training programme to the school boys, the investigator conducted a pilot study with 10 subjects from Tisainvillai, Tirunelveli (Dt). Based on the experience of the pilot study the group score sheet system was used. The scores sheet was introduced to record all the test results as well as individual particular. This system was useful to the researcher to record easily and also minimizes the timing.

The anaerobic training was administrated to the 10 subjects for a period of 10 days. The study was conducted to ensure the intensity and duration of training. The anaerobic training programme was scheduled with the duration and loads were based on the results of the pilot study.

3.5 Training programs

Physical training aims at the progressive development of muscular and circulo-respiratory fitness. It is common place now days to observe that fitness can have no meaning except in relation to a specific task. Yet the idea of the anaerobic training which will be reflected in performance at any task involving strenuous physical work has always been accepted by active people. The following aspects were considered for fixing load and intensity while giving the training.

Training Duration= 12 Weeks

Training Units= 4

Training Session= Max 60 minutes

The training programme separately assigned to the both sprint & jump and Throw talents.

Sprinting & Jumping talents -- Training programme table 3.3

Throwing talents - Short sprints instead of acceleration run.

Table 3.2
Concept of Training Schedules on Volume and Intensity

Zone	Duration of Work	Level Of Intensity	System Producing Energy For Work	% Energy		Rest Interval Between Reps/Sets	Total Volume
				Anaerobic	Aerobic		
1	1-15 Sec	Up to One's Limit	ATP-CP	95-100	Up to 5	3-5 / 6-8 min	300-600 m
2	15-60 Sec	maximal	ATP-CP + LA	80-90	10 to 20	5 - 6 min/ 6 - 10 min	300-800m
3	1-2 Minutes	Sub Maximal/Medium	ATP-Cp + LA + Aerobic	70-80	20-30	10 - 12 min	600-800m
4	2-3 Minutes	Medium	ATP-Cp + LA + Aerobic	60-70	30-40	10 - 12 min	600-1000m

(18th NACACTFCA International Athletic Congress)

Table 3.3- Training Schedule

WEEK DAY	MONDAY	TUESDAY	WEDNESDAY	FRIDAY
Ist week	<p>Training Tasks: Speed Acceleration run i) 4x60 m ii) 3x80 m</p> <p>Method: Repetition Intensity: Medium Recovery: 3 to 5 min between rep, 6 to 8 min between set.</p>	<p>Recreation Game</p>	<p>Training Tasks: Strength Endurance Push-ups- 2x12 rep Partner hand walk- 2x10 m Hand walk (Push-ups position)- 2x10 m Hand walk backward (Push-ups)- 2x10 m</p> <p>Method: Repetition Intensity: Medium Recovery: Full recovery (3-5 min between set)</p>	<p>Training Tasks: ABC running efficiency drill High knee walk-2x15 m High knee walk with leg knee extension-2x15 m High knee run- 2x15 m Gallop- 3x15 m</p> <p>Method: Repetition Intensity: Sub-maximum Recovery: active recovery (3-5 min between set)</p>
II nd week	<p>Training Tasks: Explosive Strength (Upper and Lower limb) Forward throw-2x5 rep Sideward throw-2x5 rep Overhead throw- 2x5 rep Backward throw- 2x5 rep Trunk rotation (sitting with partner)-2x5 rep, Underhand throw-2x5 rep Method: Repetition Intensity: Medium Recovery: 3 to 5 min per set</p>	<p>Training Tasks: Speed Endurance Acceleration run- i) 2x100 m ii) 2x80 m</p> <p>Method: Repetition Intensity: Sub-maximum Recovery: Full recovery (6-8 min between set)</p>	<p>Training Tasks: Explosive Strength (lower limb) Dot drills- 2 set, Line drills- 2 set Ladder drill- 2 set, Cone drill- 2 set Method: Repetition Intensity: Maximum Recovery: Full recovery (HR>120) (3-5 min between set)</p>	<p>Training Tasks: Absolute Speed Sprint fly's- 5x20 m 4x30 m 3x40 m Method: Repetition Intensity: Maximum Recovery: Full recovery (6-8 min between set)</p>

WEEK/ DAY	MONDAY	TUESDAY	WEDNESDAY	FRIDAY
III rd week	<p>Training Tasks: Strength Weight training Bench press- 2x 5-6 rep Half squad- 2x5-6 rep Arm curl- 2x5-6 rep Military press- 2x5-6 rep Heel raise- 2x 5-6 rep Method: Repetition Intensity: Sub-maximum Recovery: Full recovery (6-8 min between set)</p>	<p>Recreation Game</p>	<p>Training Tasks: Strength Endurance Circuit training Stations- 6, Set- 2 Duration- 30 sec Recovery- active recovery between station, 8-10 min between set Exercises- Skipping, Push ups, sit-ups, High knee run, Half squad (10 kg barbell), Burpee jump. Method: Continuous/Repetition Intensity: Medium Recovery: : Full recovery (8-10 min between set)</p>	<p>Training Tasks: ABC running efficiency drill High knee walk-2x15 m High knee walk with leg knee extension-2x15 m High knee run- 2x15 m Gallop- 2x15 m Single leg skip- 2x15 m Double leg skip- 2x15 m Leg swing forward and move-2x15 m Leg swing sideward and move- 2x15 m Straight knee run- 3x15 m Backward run-3x15 m Back kick run- 3x15 m Method: Repetition Intensity: Sub-maximum Recovery: active recovery (3-5 min between rep, 6-8 min between set)</p>

WEEK/ DAY	MONDAY	TUESDAY	WEDNESDAY	FRIDAY
IV th week	<p>Training Tasks: Speed</p> <p>In and outs- 50 m sprint-50 m jog- up to 400 m (2 sets)</p> <p>Method: Interval/Repetition Intensity: Sub maximum Recovery: : Full recovery (8-10 min between set)</p>	<p>Training Tasks: Co-ordinative Abilities</p> <p>Hurdle Drills</p> <p>Hurdle walk- 2x10 hurdle Hurdle walk with slight bounce- 2x 10 hurdle Hurdle walk sideward- 2x10 hurdle Hurdle back walk- 2x10 hurdle Alternate side walk- 2x 10 hurdle Hurdle sideward walk with slight bounce- 2x10 hurdle Method: Repetition Intensity: Medium Recovery: 3 to 5 min between set.</p>	<p>Training Tasks: Explosive Power</p> <p>Shot (3 kg),</p> <p>Forward throw- 5 rep, Backward throw- 5 rep, Overhead throw- 5 rep, Single leg Hopping- 2x 10 m Jumping – 2x 10 m Skipping- 2x 10 m Standing long jump- 5 rep Method: Repetition Intensity: Medium Recovery: 2 to 3 min between rep, 3 to 5 min between set.</p>	<p>Training Tasks: Absolute Speed</p> <p>Sprint fly's-</p> <p>5x20 m 4x30 m 3x40 m</p> <p>Method: Repetition Intensity: Maximum Recovery: Full recovery (6-8 min between set)</p>
V th week	<p>Training Tasks: Explosive Power (Lower limb)</p> <p>Dot drills- 2 set Line drill- 2 set Ladder drill- 2 set Low hurdle drill- 2 set Method: Repetition Intensity: Medium Recovery: 3 to 5 min between rep, 6 to 8 min between set.</p>	<p>Training Tasks: Speed Acceleration run</p> <p>a) 2x100 m b) 2x80 m</p> <p>Method: Repetition Intensity: Sub maximum Recovery: 3 to 5 min between rep, 8 to 10 min between set.</p>	<p>Training Tasks: Explosive Strength (Upper limb)</p> <p>Medicine Ball</p> <p>Forward throw-2x5 rep Sideward throw-2x5 rep Overhead throw- 2x5 rep Backward throw- 2x5 rep Trunk rotation (sitting with partner)-2x5 rep, Underhand throw- 2x5 rep, Pass up and down with partner-2x5 rep, Method: Repetition Intensity: Medium Recovery: 3 - 5 min between set.</p>	<p>Training Tasks: ABC running efficiency drill</p> <p>High knee walk-2x10 m High knee walk with leg knee extension- 2x10 m, Galloping- 2x10 m High knee run- 2x10 m, Single leg skip- 2x10 m, Double leg skip- 2x10 m Leg swing forward and move-3x15 m Leg swing sideward and move- 3x15 m Straight knee run- 3x15 m Method: Repetition Intensity: Sub-maximum Recovery: active recovery (6-8 min between set)</p>

VI th week	<p>Training Tasks: Strength Bench press- 2x 5-6 rep Half squad- 2x5-6 rep Leg curl- 2x5-6 rep Arm curl- 2x5-6 rep Military press- 2x5-6 rep Heel raise- 2x 5-6 rep</p> <p>Method: Repetition Intensity: Sub-maximum Recovery: Full recovery (3-5 min between set)</p>	Recreation Game	<p>Training Tasks: Strength Endurance Circuit training Stations- 6, Set- 2, Duration- 30 sec Recovery- active recovery between station, 6-8 min between set Exercises- Skipping, Pushups, sit-ups, High knee run, Half squad (10 kg barbell), Burpee jump. Method: Continuous/Repetition Intensity: Medium Recovery: : Full recovery (6-10 min between set)</p>	<p>Training Tasks: Speed Acceleration run i) 4x60 m ii) 3x80 m</p> <p>Method: Repetition Intensity: Sub maximum Recovery: 3 to 5 min between rep, 6 to 10 min between set.</p>
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<p>VII th week</p>	<p>Training Tasks: Strength Sit ups- 3x10 rep Push ups- 3x10 rep Pull-ups- 3x10 rep Balance (push-ups position-, forward, sideward)- 2x 30 sec Sit-ups balance (supine)- 2x30 sec Sit-ups balance (prone)- 2x30 sec Balance Bridge Posture- 2x30 sec Method: Repetition Intensity: Sub-maximum Recovery: Full recovery (3-5 min between set)</p>	<p>Training Tasks: Speed Endurance Shuttle run- 2x 40 m Method: Continuous and Repetition Intensity: Medium Recovery: 6 to 10 min between set.</p>	<p>Training Tasks: Coordinative Abilities Hurdle Drills Hurdle walk- 3x10 hurdle Hurdle walk with slight bounce- 3x 10 hurdle Hurdle walk sideward- 3x10 hurdle Hurdle back walk- 3x10 hurdle Alternate side walk- 3x 10 hurdle Hurdle sideward walk with slight bounce- 3x10 hurdle Method: Repetition Intensity: Medium Recovery: 3 to 5 min between set.</p>	<p>Training Tasks: Absolute Speed Sprint fly's- 5x20 m 4x30 m 3x40 m 2x50 m 1x60 m Method: Repetition Intensity: Maximum Recovery: Full recovery between set (3-5 min between rep)</p>
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VIII th week	<p>Training Tasks: Explosive Strength (Upper limb) Forward throw-2x5 rep Sideward throw-2x5 rep Overhead throw- 2x5 rep Backward throw- 2x5 rep Trunk rotation (sitting with partner)-2x5 rep Underhand throw-2x5 rep Pass up and down with partner-2x5 rep Method: Repetition Intensity: Medium Recovery: 3 to 5 min between set.</p>	<p>Training Tasks: Speed Fast continuous- 5 min In and outs- 50 m sprint-50 m jog- up to 400 m (2 sets)</p> <p>Method: Interval/Repetition Intensity: Sub maximum Recovery: : Full recovery (6-8 min between set)</p>	<p>Training Tasks: Explosive Power (Lower limb) Dot drills- 2 set Line drill- 2 set Ladder drill- 2 set Low hurdle drill- 2 set Method: Repetition Intensity: Medium Recovery: 2 to 3 min between rep, 3 to 5 min between set.</p>	<p>Training Tasks: ABC running efficiency drill High knee walk-3x15 m High knee walk with leg knee extension-3x15 m High knee run- 3x15 m Galloping- 3x15 m Single leg skip- 3x15 m Double leg skip- 3x15 m Leg swing forward and move-3x15 m Leg swing sideward and move- 3x15 m Straight knee run- 3x15 m Backward run-3x15 m Back kick run- 3x15 m Method: Repetition Intensity: Sub-maximum Recovery: active recovery (1-3 min between set)</p>
IX th week	<p>Training Tasks: Speed Acceleration run 1x100 m 2x80 m 3x00 m Method: Repetition Intensity: Sub maximum Recovery: 2 to 3 min between rep, 3 to 5 min between set.</p>	Recreation game	<p>Training Tasks: Explosive Power (Lower limb) Dot drills- 2 set Line drill- 2 set Ladder drill- 2 set Low hurdle drill- 2 set Method: Repetition Intensity: Medium Recovery: 2 to 3 min between rep, 3 to 5 min between set.</p>	<p>Training Tasks: Absolute Speed Sprint fly's- 5x20 m 4x30 m 3x40 m 2x50 m 1x60 m</p> <p>Method: Repetition Intensity: Maximum Recovery: Full recovery (3-5 min between set)</p>

WEEK/ DAY	MONDAY	TUESDAY	WEDNESDAY	FRIDAY
X th week	<p>Training Tasks: Strength Weight training Bench press- 3x 5-6 rep Half squad- 3x5-6 rep Leg curl- 3x5-6 rep Arm curl- 3x5-6 rep Military press- 3x5-6 rep Heel raise- 3x 5-6 rep Method: Repetition Intensity: Sub-maximum Recovery: Full recovery (1-3 min between set)</p>	<p>Recreation game</p>	<p>Training Tasks: Coordination and Speed Endurance Sideward, forward, backward, alternate run - 2x15 m Zig-zag run- 2x20 m Shuttle run-2x40 m Method: Repetition Intensity: Sub-maximum Recovery: Full recovery (3-5 min between set)</p>	<p>Training Tasks: Speed Acceleration run i) 4x60 m ii) 3x80 m iii) 1x100 m Method: Repetition Intensity: Medium Recovery: 2 to 3 min between rep, 3 to 5 min between set.</p>
XI th week	<p>Training Tasks: Coordinative Abilities Hurdle Drills Hurdle walk- 3x10 hurdle Hurdle walk with slight bounce- 3x 10 hurdle Hurdle walk sideward- 3x10 hurdle Hurdle back walk- 3x10 hurdle Alternate side walk- 3x 10 hurdle Hurdle sideward walk with slight bounce- 3x10 hurdle Method: Repetition Intensity: Medium Recovery: 3 to 5 min between set.</p>	<p>Training Tasks: Speed Fast continuous- 10 min In and outs- 50 m sprint-50 m jog- up to 400 m (2 sets) Method: Interval/Repetition Intensity: Sub maximum Recovery: : Full recovery (3-5 min between set)</p>	<p>Training Tasks: Speed Endurance Acceleration run- i) 3x150 m ii) 2x200 m Method: Repetition Intensity: Medium Recovery: Full recovery (3-5 min between set)</p>	<p>Training Tasks: Muscular Endurance Sit ups- 3x10 rep Push ups- 3x10 rep Pull-ups- 3x10 rep Balance (push-ups position-balanced, forward, sidward)- 2x 30 sec Sit-ups balance (supine)- 2x30 sec Sit-ups balance (prone)- 2x30 sec Balance Bridge Posture- 2x30 sec Method: Repetition Intensity: Sub-maximum Recovery: Full recovery (3-5 min between set)</p>

WEEK/ DAY	MONDAY	TUESDAY	WEDNESDAY	FRIDAY
XII th week	<p>Training Tasks: Absolute Speed Sprint fly's- 5x20 m 4x30 m 3x40 m 2x50 m 1x60 m</p> <p>Method: Repetition Intensity: Maximum Recovery: Full recovery (3-5 min between set)</p>	<p>Recreation Game</p>	<p>Training Tasks: Explosive Power (Lower limb) Dot drills- 2 set Line drill- 2 set Ladder drill- 2 set Low hurdle drill- 2 set Method: Repetition Intensity: Medium Recovery: 2 to 3 min between rep, 3 to 5 min between set.</p>	<p>Training Tasks: Flexibility Dynamic Leg swing forward jump- 2x5 rep Leg swing backward jump- 2x5 rep Leg split forward, backward-2x15 sec hold</p> <p>PNF – Stretch is given to the all major muscles and joints.</p>

3.6 Administration of Test

Talent Identification Programme

Somatotypes

1. Height- **Stadiometer**
2. Weight- **Electronic Weighing Machine (100 gm accuracy)**
3. Triceps Skinfold- **Harpenden Skinfold Caliper (Pressure of 10gm/mm²)**
4. Subscapular Skinfold- **Harpenden Skinfold Caliper (Pressure of 10gm/mm²)**
5. Supraspinale Skinfold- **Harpenden Skinfold Caliper (Pressure of 10gm/mm²)**
6. Medial Calf Skinfold- **Harpenden Skinfold Caliper (Pressure of 10gm/mm²)**
7. Biepicondylar Breadth of Humerus- **Sliding Caliper**
8. Biepicondylar Breadth of Femur- **Sliding Caliper**
9. Upper Arm Girth- **Flexible tape**
10. Lower Limb Girth- **Flexible tape**

Somatotypes can be measure by using **Heath and Carter Anthropometric method**

Talent Screening Field Test for Sprint and Jump Events

1. Somatotyping- (Endomorphy, Mesomorphy, Ectomorphy)
2. Leg Dynamometer Test- **Isometric Strength**
3. 50 m Sprint- **Speed**
4. Standing Broad Jump- **Explosive Power**
5. Vertical Jump- **Explosive Power**
6. Five Consecutive Hop- **Explosive Strength and Coordination**

(Hanson et al, 1984, Recev, 1985, Ionov, 1982, Rodford, 1984, Tabachnik, 1979, Balsevich, 1980, Jones, 1997,

Talent Screening Field Test for Throw Events

1. Somatotyping -(Endomorphy, Mesomorphy, Ectomorphy)
2. Leg Dynamometer Test- **Isometric Strength**
3. 50 m Sprint- **Speed**
4. Standing Broad Jump- **Explosive Power**
5. Standing Triple Jump- **Explosive Power and Coordination**
6. Pushups for 30 sec- **Muscular Strength and Endurance**
7. Shot Backward Throw over the Head- **Arm Strength**

(Hanson et al, 1984, Recev, 1985, Jones, 1997, Jarver. 1979, Rudermen and Komarova, 1984)

Developmental Anaerobic Training

Motor Fitness Variables

1. Muscular Strength-**Isometric Leg Strength Test**
2. Muscular Endurance-**Sit Up Test**
3. Speed- **50 m Dash Test**
4. Explosive Power-**Vertical Jump Test**
5. Cardio-respiratory Endurance-**600 m Run Test**
6. Flexibility-**Sit and Reach Flexibility Test**
7. Coordination-**Plate Tapping Test**

Track and Field Performance Variables

1. 100m Sprint
2. Long Jump
3. Shot -put Throw

Height**Purpose**

To measure the height of the subject.

Equipment

Stadiometer, scale, pencil and individual score sheet.

Procedure

Height (Stature) was taken against a height scale or stadiometer by taking height with the subject standing straight, against an upright wall or stadiometer, touching the wall with heels, buttocks and back. The head was oriented in Frankfort plane (the upper border of the ear opening and the lower border of the eye socket on a horizontal line), and the heels together. The subject was instructed to stretch upward and to take and hold a full breath. Lower the head board until it firmly touches the vertex. A mark was made with chalk piece on the side of the scale in the stadiometer, after that the subject stepped away from the stadiometer stand board.

Scoring

The vertical distance from the stadiometer stand board to chalk piece mark was measured. The measurement will be taken to the nearest one centimeter.

Weight**Purpose**

To measure the Body weight.

Equipment

Weighing machine and score sheet.

Procedure

The subjects wearing minimal clothing stood in the center of the scale platform with barefoot. The heels were on the weighing machine without elevating it and the body was kept in erect position. After the scale vibration was stopped, the reading will be taken.

Scoring

The weight was recorded in kilograms (Kg).

Skinfold Measurement

Purpose

To measure the subcutaneous fat tissue.

Equipment

Harpender skinfold caliper (Pressure of 10gm/mm²) and score sheet.

Procedure

A fold of skin and subcutaneous tissue was raised firmly between thumb and forefinger of the left hand and away from the underlying muscle at the marked site. The edge of the plates was applied on the caliper branches 1 cm below the fingers of left hand and allowed them to exert their full pressure before reading at 2 sec the thickness of the fold. All skinfold was taken on the right side of the body. The subject stands relaxed, except for the calf skinfold, which was taken with the subject seated.

Triceps Skinfold

The subject's arm loosely in the anatomical position, raised a fold at the back of the arm at a level halfway on a line connecting the acromion and the olecranon processes.

Subscapular Skinfold

The subscapular skinfold was raised on a line from the inferior angle of the scapula in a direction that was obliquely downwards and laterally at 45 degrees.

Supraspinale Skinfold

The fold 5-7 cm was raised (Depending on the size of the subject) above the anterior superior iliac spine on a line to the anterior auxiliary border and a diagonal line going downwards and medially at 45 degrees. (This skinfold was firmly called suprailiac or anterior suprailiac).

Medial Calf skinfold

A vertical skinfold was raised on the medial side of the leg, at the level of the maximum level of the girth.

Scoring

Skinfold was measured to the nearest 0.1 mm.

Biepicondylar Breadth of Humerus

Purpose

To measure the breadth of the biepicondylar humerus bone.

Equipment

Small sliding caliper (Caliper branches must extend to 10 cm and the tips should be 1.5 cm in diameter), and score sheet.

Procedure

The width between medial and lateral epicondyles of the humerus, with the shoulder and elbow flexed to 90 degrees. The caliper was applied at an angle approximately bisecting the angle of elbow. Firm pressure was placed on the crossbars in order to compress the subcutaneous tissue.

Scoring

Recorded to the nearest 0.1 mm

Biepicondylar Breadth of Femur

Purpose

To measure the breadth of the biepicondylar femur bone.

Equipment

Small sliding caliper (Caliper branches must extend to 10 cm and the tips should be 1.5 cm in diameter), and score sheet.

Procedure

The subject was seated with knee bent at right angle. The greatest distance between the lateral and medial epicondyles of the femur was measured with firm pressure on the crossbars in order to compress the subcutaneous tissue.

Scoring

Recorded to the nearest 0.1 mm.

Upper Arm Girth

Purpose

To measure the girth of upper limb (Arm flexed and tensed).

Equipment

Flexible tape and score sheet.

Procedure

For measuring upper arm girth, elbow flexed and tensed, right. The subject flexed the shoulder to 90 degrees and the elbow to the 45 degrees. Clenched the hand, and maximally contracted the elbow flexors and extensors. The measurement was taken at the greatest girth of the arm.

Scoring

Recorded to the nearest mm.

Lower Limb Girth**Purpose**

To measure the girth of lower limb (Calf)

Equipment

Flexible tape and score sheet.

Procedure

The subjects stood with feet slightly apart. The tape was placed around the calf and measured the maximum circumference.

Scoring

Recorded to the nearest mm.

Assessment of Somatotype By Means of Anthropometric Equation Equation

The second method of obtaining the anthropometric somatotype was by means of equation in to which data were entered.

Endomorphy

$$\text{Endomorphy} = -0.7182 + 0.1451 (X) - 0.00068 (X^2) + 0.0000014 (X^3)$$

Where,

X = Sum of triceps, Subscapular and Supraspinale skinfolds) multiplied by (170.18/height in cm).

Mesomorphy

$$\text{Mesomorphy} = 0.858 X \text{ humerus breadth} + 0.601 X \text{ femur breadth} + 0.188 X \text{ corrected arm girth} + 0.161 X \text{ corrected calf girth} - \text{height } 0.131 + 4.5.$$

Ectomorphy

There were three different equations; they were used to calculate ectomorphy according to height-weight ratio.

If HWR was greater than or equal to 40.75 than

$$\text{Ectomorphy} = 0.732 \text{ HWR} - 28.58$$

If HWR was less than 40.75 but greater than 38.25 then

$$\text{Ectomorphy} = 0.463 \text{ HWR} - 17.63$$

If HWR was Equal to or less than 38.25 then

$$\text{Ectomorphy} = 0.1.$$

The preceding equation, derived from data used by Heath & Carter (1967). The equation for endomorphy was a third degree polynomial. The equation for mesomorphy and ectomorphy were linear. (When the HWR was below 40.75 a different equation was used for ectomorphy.) If the equation calculation for any component was zero or negative, a value of 0.1 was assigned as the component rating, because by definition ratings could not be zero or negative.

Muscular strength (Isometric)

This is the capacity of an individual to exert muscular force against a resistance. The following are the physiological and mechanical factors can determine these force in any particular movement.

1. The size and number of muscles involved
2. The proportion of fibers activated.
3. The coordination of muscle groups.
4. The conditions of muscle
5. The actions of the lever employed.

It is obviously impossible to measure the strength of each and every muscle in the body. However, there are various kinds of strength measuring instruments such as spring, cable, electric and hydraulic dynamometer, which can be adopted to measure the strength of the individual in a wide variety of movements. Since strength is so important in motor performance indices, which provide good indication of and individual general ability to work (Devendra Balayan, 2006, 9-10).

Isometric Leg Strength Test (www.topendsports.com)

An isometric muscle contraction is when force is applied to a static object so there is no movement at the joint. Apparatus can be used to measure the maximum force applied

Purpose

This test measures back and leg strength

Equipment required

Strength dynamometer, usually composed of a cable tensiometer

Procedure

The dynamometer dial was resettled to zero before start. The subjects were asked to stand upright on the base of the dynamometer with the feet shoulder width apart. Their arms hang straight down to hold the center of the bar with both hands, and with the palms facing towards the body. The chain was adjusted so that the knees are bent at approximately 110 degrees. In this position subjects back should be bent slightly forward at the hips, head should be held upright, and they should look straight ahead. Then without bending their back, they were asked to pull as hard as possible on the chain and try to straighten legs, keeping arms straight. They asked to pull against the weight steadily (no jerky movements), keeping the feet flat on the base of the dynamometer. Maximum performance result when their legs are almost straight at the end of the lift. If not, adjust the chain length and starting position.

Scoring

The reading was marked from the dynamometer

Muscular Endurance

This is local endurance. It represents the capacity of the individual for continuous performance of relatively heavy localized activity such as working a pump handle or sawing wood. Muscular endurance dependence to a large extent upon strength but also upon other qualities, among them the efficiency of the blood supply in the muscles involved, and the viscosity of the muscle tissue. Muscular endurance is obviously a most important component of motor fitness for work or play and it should figure in any test of appraisal of fitness levels or training schemes (Devendra Balayan, 2006, 8).

Sit Up Test

Purpose

Abdominal muscle strength and endurance is important for core stability and back support. This sit up test measures the strength and endurance of the abdominals and hip-flexor muscles.

Equipments

Mat or floor, stop watch

Procedure

The subjects were asked to lie on a carpeted floor with their knees bent at approximately right angles, with feet flat on the ground and hands should be resting on behind the back. A partner holds the examinees feet to keep them in contact with the testing surface. The examinee curls to a sitting position, maintaining arm contact on the back side of head. The chin should be tucked on the chest and should remain in this position until the completion of the sit-ups. When the elbows touch the thighs, the sit-ups is completed. The examinee curls back down to the floor until mid back contacts the testing surface. Another sit-up is then be attempted

Scoring

The score is the number of sit-ups executed correctly during 30 seconds. The incorrect execution includes failure to curl up, pulling the chest away the body, failure to touch the thigh with elbows and failure to touch the mid back to the testing surface in the down position.

Speed

50 m Sprint Test

Purpose

The purpose of the test is to measure speed. The test is suitable for both boys and girls aged 8 years and above.

Equipment

Athletic track, playground or football field a with a marked starting line and a finish line, two stopwatches.

Procedures

The researcher gave in advance, instruction to the subjects as follows “you are required to take any position behind the starting signal. On receiving commend do! You are to start running as fast as possible till you reach the finish line. You are to slow down gradually only after crossing the subjects preferably in pairs, are asked to take the starting position behind the starting line and to wait for for the signal ‘Go’. A separate helper with a stopwatch is required to watch each subject at the finish line. The tester gives commends ready, steady, ‘Go’ so that these are audible easily to subjects at the start line and the timers at the finish. At the Go! the timers start their respective stopwatches and the subjects start their sprints. As soon as the subjects cross the finish line, the respective timer switches off his/her stopwatch and records the time accurate up to 0.01 second. Only one correct trial as permitted. The subject is asked to restart the sprint in case he/she starts before the word go or fails start quickly at the command Go.

Scoring

The time elapsed from the start to the instant, subject crosses the finish line, is the score expressed usually upto hundredth of a second.

Explosive power

A good test of ability to develop power relative to body weight is the vertical jump, which measures the height to which the performer can project his center of gravity in a simple upward jump off both feet (Devendra Balayan, 2006, 8-9).

Vertical Jump Test

Purpose

This procedure describes the method used for directly measuring the vertical jump height jumped.

Equipment required

Measuring tape or marked wall, chalk for marking wall

Procedure

The athlete stands side on to a wall and reaches up with the hand closest to the wall. Keeping the feet flat on the ground, the point of the fingertips is marked or recorded. This is called the standing reach height. The athlete then stands away from the wall, and leaps vertically as high as possible using both arms and legs to assist in projecting the body upwards. The jumping technique can or cannot use a countermovement. Attempt to touch the wall at the highest point of the jump. The difference in distance between the standing reach height and the jump height is the score. The best of three attempts is recorded.

Scoring

The best of three jump height is usually recorded as a distance score.

Cardio-respiratory Endurance

Cardio respiratory endurance is most evident in performance at tasks of medium intensity involving the whole body. All exercise calls for compensatory adjustment in the circulatory and respiratory system. In mild exercise there are hardly notices; in exercise of great intensity such as weight training, local exhaustion in the muscles may set in before any great demands are made upon the heart and lung. But in exercise such as running, cycling, rowing or continuous jumping, which involves rapid and prolonged action of large muscle groups, it is cardio respiratory efficiency which will delay the onset of fatigue. This quality, though easily recognized in an individual, is difficult to measure satisfactorily. One of the most commonly used measures of circulatory respiratory endurance is that based on prolonged run and pulse rate recovery after a stand (Devendra Balayan, 2006, 10-11).

600 m Run (www.brianmac.com)

Purpose

This test measures aerobic endurance, as a measure of health and an important component of many sporting activities.

Equipment

400 m track, stopwatch, and chunnam.

Procedures

The purpose of this test is to complete 600 meters in the fastest possible time. After the purpose of the test and instructions are given, the participants begin running on the count "Ready? Go!", they should be encouraged to cover the distance in as short a time as possible.

Scoring

The time was recorded to the nearest two decimal places as minutes and seconds.

Flexibility

Sit and Reach Flexibility Test (www.topendsports.com)

The sit and reach test is a common measure of flexibility, and specifically measures the flexibility of the lower back and hamstring muscles. This test is important because tightness in this area is implicated in lumbar lordosis, forward pelvic tilt and lower back pain. This test was first described by Wells and Dillon (1952) and is now widely used as a general test of flexibility.

Equipment required

Sit and reach box (or alternatively a ruler can be used, and a step or box)

Procedure

This test involves sitting on the floor with legs stretched out straight ahead. Shoes should be removed. The soles of the feet are placed flat against the box. Both knees should be locked and pressed flat to the floor - the tester may assist by holding them down. With the palms facing downwards, and the hands on top of each other or side by side, the subject reaches forward along the measuring line as far as possible. Ensure that the hands remain at the same level, not one reaching further forward than

the other. After some practice reaches, the subject reaches out and holds that position for at one-two seconds while the distance is recorded. There are no jerky movements.

Scoring

The maximum distance was measured as cm from the best of three trails.

Coordination

Coordination is the ability to integrate separate motor systems with varying sensory modalities and produce efficient movement patterns (Gallahue, 1982). The more complex movement pattern or sequence of patterns, the greater the degree of coordination necessary for successful performance. Although all movements use visual information in one way or another, some commonly accepted examples of gross visual-motor skills are throwing, catching, kicking, striking and ball bouncing. Coordination is interrelated with skill related fitness components, such as balance, speed, reaction time and agility and not closely affiliated with muscular strength, endurance, or power. In sum, coordinated movement is that which is rhythmical, properly sequenced, and devoid of any superfluous actions.

The development of coordinative skills is gradual, linearly related to age, and dependent on visual and motor maturation. Performance on tests of coordination tends to be superior for boys when compared to girls. Gross body coordination in children is associated with moving the body rapidly while performing various fundamental skills. Peterson have reported a strong relationship among measures of the shuttle run, 30 yard dash, basic locomotor movement and the standing long jump and gross body coordination (Douglas,1989, 209).

Plate Tapping Test (www.topendsport.com).

The plate tapping test is the reaction test using a alternating wall tapping action which measures upper body reaction time, hand eye quickness and coordination. This test is part of the Eurofit test battery

Purpose

To assess the speed and the coordination of limb movement.

Equipment

Table, yellow discs (20 cm diameter), rectangle (30x20 cm) and stop watch.

Procedures

For the purpose of the test two yellow discs are placed with their center 60 cm apart on the table. The rectangle is placed equidistant between the two discs. The non-preferred hand is placed on the rectangle. The subjects moves the preferred hand back and forth between the discs over the hand in the middle as quick as possible. This action is repeated for 25 full cycles.

100 m Dash (www.topendsports.com)

Sprint or speed tests can be performed over varying capacities, depending on the factors being tested and the relevance to the sport. The 100 meter sprint is part of the track and field events.

Purpose

The aim of this test is to determine acceleration and speed.

Equipment required

Measuring tape or marked running track, stopwatches and chunnam.

Procedure

The test involves running a single maximum sprint over 100 meters, with the time recorded. A thorough warm up should be given, including some practice starts and accelerations. Start from a stationary position, with one foot in front of the other. The tester asked to continue running maximally through the finish line without stopping. The person timing should stand at the finish line with one arm held high, call 'ready' then sweep down their arm quickly to start the subject (do not call 'go' due to the time delay in the subject hearing it). As the arm sweeps down, the tester should start the stopwatch which is held in the downward sweeping arm, and finish the stopwatch as their chest passes through the finish line.

Scoring

The time was recorded to the nearest two decimal places.

Long Jump (www.brianmac.com)

Purpose

This test measures the power of legs in jumping horizontal distance and may be applied to children of both sexes aged seven years and above.

Equipment

Long jump pit, measuring tape and chunnam.

Test administration

A demonstration of the long jump is given to a group of subjects to be tested. The subject is then asked to take run-up, which depend on the athlete's speed (mostly 11- 13 strides). The start of the approach run should be marked and the athlete should commence the start from a standing start. The athlete begins the run with a marked point and he is instructed to jump as farthest as possible by bending knees and winging arm is to take off for the broad jumping the forward direction. The subject is given three trials.

Scoring

The distance between the take-off board and the nearest point of landing provides the score of the test. The best trial is used as the final score of the test.

Shot-put Throw (www.brianmac.com)

Purpose

This test measures core body strength and total body power.

Equipment

4 kg shot, tape measure, clear open area for testing.

Procedure

The athlete starts with facing toward the throwing area, with their feet behind the start line. The subject should take up the position with the weight over the right foot and should be encouraged to think of "chin-knee-toe" being vertically in line. The feet and hips should be facing the side (at right angles to the shoulders) and the shoulder "cocked" to the rear. The width of the stance will vary according to the height of the athlete but the feet should be aligned. The subject then put the throw towards the throwing direction with full potentials. Warm-up practices may be required to get the best trajectory for maximum distance.

Scoring

Measurement is made from the starting line to the point of impact of the shot put with the ground. The measurement is recorded in meters and centimeters. The best result of two trials is recorded.

Standing broad jump (www.topensports.com)

Purpose

This test measures the power of legs in jumping horizontal distance and may be applied to children of both sexes aged seven years and above.

Equipment

Floor, mat or long jump pit and measuring tape.

Test administration

A demonstration of the standing broad jump is given to a group of subjects to be tested. The subject is then asked to stand behind the starting line with the feet parallel to each other. He is instructed to jump as farthest as possible by bending knees and winging arm is to take off for the broad jumping the forward direction. The subject is given three trials.

Scoring

The distance between the starting line and the nearest point of landing provides the score of the test. The best trial is used as the final score of the test.

Standing Triple Jump (www.topendsports.com)

Purpose

This test involves a hop, step and jump from a standing position, and tests the co-ordination and leg strength of the participants (www.topendsports.com)

Equipment

Floor, mat or long jump pit and measuring tape.

Test administration

A demonstration of the standing triple jump is given to a group of subjects to be tested. A practice jump is permitted so that the athlete can determine correct execution. The athlete must stand with both feet behind the selected take off line, usually with one foot in front of the other. They are allowed to crouch or have a rocking motion leading up to the jump. The free leg may be used to generate momentum by raising the knee up and down, while the take off foot can be rocked from heel to toe as long as some part of the foot remains in contact with the mat. The hop involves a one footed take off with the athlete landing onto the same foot, then a step is taken onto the other foot, then the jump is performed by finally landing on both feet. If the athlete steps back after landing, or falls back or touches the mat or floor behind their heel, a no jump is recorded.

Scoring

Measurement is taken from the take off line to the back of the closest heel on landing.

Five Consecutive Hop Test (www.Topendsports.com)

Purpose

This is a test of leg power in which have to perform five consecutive horizontal hops. The test helps to measure horizontal and vertical power of the legs with a component of balance and coordination.

Equipment

Measuring tape, flat surface, and chunnam.

Procedure

The aim of this test is to perform five consecutive single-leg (dominant leg) hops as far as possible. The tape was used to mark the testing area approximately 20 meters towards hopping direction and to aid recording the hop distance. The athlete starts by standing behind a line with feet shoulder width apart. When the tester says the command ready, the subjects have to perform five consecutive hops non-stop, using a forward as well as a vertical jump style that allows them to gain maximum distance. They are able to use their arms assist the explosive movement and for balance.

Scoring

The measurement is taken from take-off line to the nearest point of contact on the landing of the fifth hop (back of the heels). The longest hopping distance was recorded from the best of three trails.

Push-ups (www.topensports.com)

Purpose

The push-up test used to measure upper body strength and endurance.

Equipment

Floor mat or flat ground, stopwatch

Procedure

The aim of this test is to perform as many push-ups in one minute. The starting position is with arms straight, elbows locked, body straight, hands placed slightly wider than shoulder-width apart with fingers pointing forward and both feet on the floor. From the starting position, on the command 'go,' start the push-up by bending elbows and lowering the body until the shoulders drop below the level of the elbows, then return to the starting position. Pausing to rest is permitted only in the up (starting) position.

Scoring

The maximum number of correctly performed pushups is recorded.

Shot Backward Throw (www.topendsports.com)

This test involves throwing a 4 kg shot put for maximum distance. The shot-put backward throw test is one of the tests used in the International Physical Fitness Test.

Purpose

This test measures core body strength and total body power.

Equipment

4 kg shot, tape measure, clear open area for testing.

Procedure

The thrower must commence the throw from a stationary position and leave the circle after completing the throw. The shot must fall within a 40 degree sector at the front of the circle. The shot must be put above the head in backward direction with two hands.

Scoring

Measurement is made from the starting line to the point of impact of the shot put with the ground. The measurement is recorded in meters and centimeters. The best result of two trials is recorded.

3.7 Statistical Procedure

The following statistical procedures were adopted.

The collected data (Talent identification test scores) were converted into standardized scores by using T-Scores. The multiple regression analysis had applied to evaluate the influence of talent identification model (Sprint & jump and Throw model) by fit with dependent variables (performance). Then the training effect was statistically analysed to find out significance differences between pre and post test by using paired 't' test at 0.05 level of confidence. The significance difference between the experimental group and control group mean gain was analysed by using independent 't' test.