CHAPTER - III

METHODOLOGY

In this chapter, the selection of subjects, selection of variables, selection of tests, research design, pilot study, reliability of the data, tester’s reliability, subject’s reliability, reliability of the equipment, orientation of the subjects, criterion measures, vision training program, tests administration, collection of the data and statistical procedures have been explained.

3.1 SELECTION OF SUBJECTS

To achieve the purpose of the study, forty (N=40) male inter-collegiate basketball players from St.Berchaman’s College, Changanassery and sports coaching centre, Thiruvalla, Kerala, India were selected. The age of the subjects selected for this study was ranged between 17 and 22 years.

3.2 SELECTION OF VARIABLES

Based on the available scientific literatures pertaining to, sports vision training and in consultation with experts, the following dependent variables were selected for this study.

3.2.1 DEPENDENT VARIABLES

3.2.1.1 Visual Skills

a. Dynamic Visual Acuity

b. Depth Perception

c. Arm Eye Coordination

d. Peripheral Vision
3.2.1.2 Basketball Performance Factors
   a. Speed Dribble
   b. Dribble and Shoot
   c. Passing

3.2.2. INDEPENDENT VARIABLES
   a) Sports Vision Training

3.3. RESEARCH DESIGN
   The research design of the study was random group design. Forty (N=40) male inter collegiate basketball players from ST.Berchaman’s College, Changanassery and sports coaching center Thiruvalla, Kerala, India were selected. The selected subjects were randomly assigned into two equal groups (n=20) namely, Group-I acted as Sports Vision Training Group (SVTG), Group –II acted as control group (CG). The pretest was conducted on two groups in the selected visual skills and performance factors before training. The training period was twelve weeks and three sessions a week on alternative days. Group-I underwent sports vision training, and control group did not receive any specific training. After the completion of twelve weeks training the post-test was conducted on two groups on the selected criterion variables.

3.4. PILOT STUDY
   The training and testing procedure adopted by the investigator was put into test through a pilot study with ten subjects. The selected visual skills and performance factors were measured according to the guidelines framed and based on the procedure to be adopted. The sports vision training was implemented for five days and post test was conducted. The pilot study paved the way to proceed successfully with the collection of data.
3.5. RELIABILITY OF EQUIPMENT

In the present study, standard equipment was used to assess the dependent variables. The selected visual skills variables were measured with standard equipment. The selected performance factors were measured by standardized tests. All the instruments used in this study were in good condition and purchased from reputed and reliable companies. Their calibration were tested and found to be accurate enough to serve the purpose of the study.

3.6. ORIENTATION TO THE SUBJECTS

Before the commencement of sports vision training program, the investigator explained the subjects, the purpose of the training program and their role in the investigation. The subjects were motivated to attend the practice sessions regularly. All the subjects were motivated to perform to their maximum level during the training sessions and the testing periods.

3.7. TRAINING PROGRAMME

3.7.1 Sports Vision Training Group

The sports vision training program was scheduled for three days (Monday, Wednesday, and Friday) per week in the morning between 6.30 a.m. and 8.00 a.m. for twelve weeks. The sports vision training programs consisted of warm up and stretching for 10 - 15 minutes cool down for 5 – 10 minutes.

The intensity was fixed 6 rep/30sec of two set and 90sec rest between each exercise during the first four weeks and the intensity was increased to 9rep/45sec of two sets and 60sec rest between each exercise during the second four weeks and finally the intensity was increased and fixed to 12rep/60sec of two sets and 45 sec recovery period between each exercise during the last four weeks.
The training was given under the direct supervision of the investigator.

3.7.2 Control Group

Control group did not undergo any form of special training. But they were performing their routine work.

3.8 SPORTS VISION TRAINING EXERCISE

<table>
<thead>
<tr>
<th>S.No</th>
<th>Training Program</th>
<th>1 to 4 weeks</th>
<th>5 to 8 weeks</th>
<th>9 to 12 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Reps &amp;Set</td>
<td>Reps &amp;Set</td>
<td>Reps &amp;Set</td>
</tr>
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<td></td>
<td></td>
<td>90 sec rest</td>
<td>60 sec rest</td>
<td>45 sec rest</td>
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<tr>
<td>1</td>
<td>Basic eye exercise</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
</tr>
<tr>
<td>2</td>
<td>Tennis ball wall pass</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
</tr>
<tr>
<td>3</td>
<td>Pencil push up</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
</tr>
<tr>
<td>4</td>
<td>Peripheral chart</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
</tr>
<tr>
<td>5</td>
<td>Basketball dribble and read</td>
<td>30sec×2</td>
<td>45sec×2</td>
<td>60 sec×2</td>
</tr>
<tr>
<td>6</td>
<td>Simultaneous ball throw</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
</tr>
<tr>
<td>7</td>
<td>Two ball dribble</td>
<td>30sec×2</td>
<td>45sec×2</td>
<td>60 sec×2</td>
</tr>
<tr>
<td>8</td>
<td>Zig-Zag dribble</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
</tr>
<tr>
<td>9</td>
<td>Varied distance passing</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
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## TABLE-II

SPORTS VISION TRAINING PROGRAM (DAY 2)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Training Program</th>
<th>1 to 4 weeks</th>
<th>5 to 8 weeks</th>
<th>9 to 12 weeks</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Reps &amp; Set</td>
<td>90 sec rest</td>
<td>60 sec rest</td>
<td>45 sec rest</td>
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<td>Basic eye exercise</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
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<tr>
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<td>Cross over throw</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
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<tr>
<td>3</td>
<td>Push up and shoot</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
</tr>
<tr>
<td>4</td>
<td>Change of hand Low dribble</td>
<td>30sec×2</td>
<td>45sec×2</td>
<td>60 sec×2</td>
</tr>
<tr>
<td>5</td>
<td>Wobble board reading</td>
<td>30sec×2</td>
<td>45sec×2</td>
<td>60 sec×2</td>
</tr>
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<td>6</td>
<td>Basketball dribble and change the spot</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
</tr>
<tr>
<td>7</td>
<td>Zigzag dribble and shoot</td>
<td>30sec×2</td>
<td>45sec×2</td>
<td>60 sec×2</td>
</tr>
<tr>
<td>8</td>
<td>Perception shooting</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
</tr>
<tr>
<td>9</td>
<td>Beating the defence 1 vs 1</td>
<td>30sec×2</td>
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### TABLE-III

**SPORTS VISION TRAINING PROGRAM (DAY 3)**

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<th>S.No</th>
<th>Training Program</th>
<th>1 to 4 weeks</th>
<th>5 to 8 weeks</th>
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<td>Reps &amp;Set</td>
<td>Reps &amp;Set</td>
<td></td>
</tr>
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<td>90 sec rest</td>
<td>60 sec rest</td>
<td>45 sec rest</td>
<td></td>
</tr>
<tr>
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<td>Basic eye exercise</td>
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<td>9 rep×2</td>
<td>12 rep×2</td>
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<td>Passing off the ball</td>
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<td>60 sec×2</td>
</tr>
<tr>
<td>3</td>
<td>Alternate dribbling</td>
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<td>12 rep×2</td>
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<td>4</td>
<td>Tube run and read</td>
<td>30sec×2</td>
<td>45sec×2</td>
<td>60 sec×2</td>
</tr>
<tr>
<td>5</td>
<td>Peripheral Post</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
</tr>
<tr>
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<td>Changing wall pass</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
</tr>
<tr>
<td>7</td>
<td>Dribbling and passing</td>
<td>30sec×2</td>
<td>45sec×2</td>
<td>60 sec×2</td>
</tr>
<tr>
<td>8</td>
<td>Three man passing</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
</tr>
<tr>
<td>9</td>
<td>Dim light shooting</td>
<td>6 rep×2</td>
<td>9 rep×2</td>
<td>12 rep×2</td>
</tr>
</tbody>
</table>
3.9 DESCRIPTION OF SPORTS VISION TRAINING DRILLS

3.9.1 Basic Eye Exercise

The subject must do basic eye exercise all training days before starting training session. The basic eye exercise consist of eye rotation, temporal, nasal, superior, inferior, and diagonal movements.

3.9.1.1 Eye rotation: - Subjects rotate their eye slowly clockwise and anti clockwise

![Eye Rotation](image1)

**Figure: I Eye Rotation**

3.9.1.2 Nasal: - In this exercise the subjects focus the eye to the tip of the nose

![Nasal Focusing](image2)

**Figure: II Nasal Focusing**
3.9.1.3 **Superior and inferior**:- The subjects move the eyeball up and down alternatively.

![Figure: III Superior Inferior](image)

3.9.1.4 **Diagonal movements**:- in this exercise the subject try to move their focus diagonally up and down.

![Figure: IV Diagonal Movements](image)
3.9.1.5 **Lateral movements:** the subjects move their eye ball left and right alternately.

![Figure: V Lateral Movements](image1)

3.9.1.6 **Focusing:** this training the subjects deliberately focus their eye.

![Figure: VI Focusing](image2)
3.9.2 Tennis Ball Wall Pass

The subject faces to the wall 3m apart. The ball thrown to the wall with right hands in under arm action and catches the ball with left hand. Then throw with left hand and catch the ball with right hand.

Figure: VII Tennis Ball Wall Pass
3.9.3 Pencil Pushup

The subject holds the pencil and extends their arm parallel to the floor. Tip of pencil in front of eye level. The subject focus eyes to the tip of the pencil then slowly move towards eye keep focusing on the tip of the pencil. Pencil comes closer to eye then draw back to the starting point.

Figure: VIII a, Pencil pushups

Figure: VIII b, Pencil pushups
3.9.4 Peripheral Chart

Place the peripheral chart in front of eye level. Focus at all time on the circle in the middle. With the help of peripheral vision read the first four letters closer to the circle. Then move out the next four letters and so on.

Figure: IX Peripheral Chart
3.9.5 Basketball Dribble and Read

The reading chart placed on the wall at the eye level. The subject stands 3m away from the chart. Dribbles the ball at the same time read the chart.

Figure: X Basketball Dribble and Read
3.9.6 Simultaneous Ball Throw

The subjects stand 2m from each other with knee bent and foot shoulder width apart. Each participant threw two balls simultaneously for the other participants to catch.

Figure: XI Simultaneous Ball throw
3.9.7 Two Ball Dribble

The subjects dribble two balls, one ball in left hand and other one in right hand, with both hands at the same time.

Figure: XII Two Ball Dribble
3.9.8 Zigzag Dribble

Place five cones in a straight line three meter apart. The subject dribble the around the corn in a zigzag manner up and down.

![Diagram of Zigzag Dribble](image)

**Figure XIII Zig Zag Dribble**

3.9.9 Varied Distance Passing

The subjects divided in to five groups, each group four subjects. Draw a 3 meter straight line and put three markings 1 meter apart on the line. Another three markings put parallel to the straight line in three varied distance. First marking 1 meter away from the line second and third markings three and five meter away from the line. One player stand on the first marking in the straight line other three stand another three markings draw 1,3 & 5 meter away from the line facing to the first subject. The
passing start from one meter distance, ten seconds in each point, the first subject move immediately to the next point and continue the passing then again change the position after ten seconds. Rotate this steps in a circle manner.

Figure: XIV Varied Distance Passing
3.9.10 Cross Over Throw

Subjects stand 2m from each other with bent knees and foot shoulder width apart. Each subject threw two balls simultaneously to opposite hands for the other subject to catch.

Figure: XV Cross Over Throw
3.9.11 Push-up and Shooting

The shooter stands outside the D circle the other one stand side of the shooter. The shooter does one push up. The shooter come on the standing position the teammate pass the ball, Shooter focus the eye on the basket doesn’t look the ball. Collect the pass and shoot.

Figure: XVI-a Pushup

Figure: XVI-b Shooting
3.9.12 Chang of Hand Low Dribble

The subjects stand one meter away face to face in bent knee position and do the change of hand low dribble. The subject does not see the ball while dribbling. The subject focus their eyes on another one eyes.

![Image of two individuals playing basketball](image)

**Figure: XVII Change of Hand Low Dribble**

3.9.13 Wobble Board Read

The subject standing on wobbles board and read the letters. The player maintains their balance while reading.

![Image of wobble board](image)

**Figure: XVIII Wobble Board Read**
3.9.14 Dribble and Change the Spot

Draw two 10m line 10m apart. 5 corn place 2m apart on line. The subject stands on the line where the corn placed. The subject dribbles the ball and took one corn and move forward. Placed the corn on the other line and move backward to the starting line and took second corn and placed the second. Continue the process till five corns placed second line.

Figure: XIX-a Dribble and Change the Spot

Figure: XIX-b Dribble and Change the Spot
3.9.15 Zigzag Dribble and Shoot

Four cones arranged in a straight line in the center and diagonally left side and right side from the basket. Each cones 3 meter apart. The subject start from the right side dribble around the cones and shoot until he makes a basket and dribble then dribble around the center line and left line cones and shoot until makes a basket. Then dribble back the same way makes a shoot in the center and come back to the starting line.

Figure: XX Zigzag Dribbles and Shoots
3.9.16 Perception Shooting

Draw two line 1 meter apart front and back. The player take 3 shot from the first line then one step forward to the second line again take 3 shot.

Step 2: the player take one step backward to the first line then close the eyes take 3 shot. Again move one step forward to the second line close the eyes take 3 shot.

Figure: XXI Perception Shooting
3.9.17 Beating the Defender 1vs1

1 vs 1 in D circle was introduced. The players dribble the ball and move to areas with more room. Defender challenges at 50%. One player with a ball in the D circle line. The player with the ball quickly looks in front and determine the best area to dribble to and quickly goes to the basket, reverse dribble and repeat. The players were asked to perform the exercise with their eye up.

Figure: XXII Beating the Defender 1vs1
3.9.18 Alternate Dribbling

The player dribble two ball, one ball in left and other one in right hand, alternately. left, right, left, right manner.

Figure: XXIII Alternate Dribbling
3.9.19 Dim Light Shooting

The subject train shooting practice in the dim light.

Figure: XXIV Dim Light Shooting
3.9.20 Tube run and read

The subjects divided into two each. One subject does the exercise other one is helper. The helper holds rubber tube around hip of the subject. The reading chart placed at eye level 3 away from the subject. The helper holds the tube tightly the other one do high knee running at the same time read the chart also.

Figure: XXV Tube Run and Read
3.9.21 Peripheral post

Pair up players with one passer and one receiver. Receiver must look directly into the eye of the passer and not at the ball. Passer throws the ball to receiver outstretched hand, alternating between right and left. Passer throw the ball high, beyond receiver line of vision. The receiver tries to catch the ball without bending the elbow. Pass the ball alternating between right hand and left hand.

Figure: XXVI Peripheral Throw
3.9.22 Moving Wall Pass

A line marks on the floor 2 meter away from the wall. Three 50cm squares marks 1 meter apart on the wall 1.5 meter from the floor. The subject stands on the line and do chest pass to squares. The subject move left and right while passing.

Figure: XXVII Moving Wall Pass
3.9.23 Dribble and Receive

The subjects divided in to pair. The subjects stand face to face 3 meter apart.

The subjects dribble the basketball at the same time pass the tennis ball.

Figure: XXVIII  Dribble and Receive

3.9.24 Three Man Passing

The subjects divide into group each group consist of three subjects. The groups stand in the end Players line up in three lines at the base line, with the ball in the middle line. Player #1 executes a proper chest pass to player #2. Player #1 immediately sprints behind the player he passed to (player #2). Meanwhile, player #2 executes a proper chest pass to player #3. Player #2 then immediately sprints behind the player he passed to (player #3). Player #3 passes to player #1 Player #3 then sprints behind player #1.
They continue to pass in this fashion - pass and go behind - until one player is close enough to cut to the basket

![Diagram of basketball game](image)

**Figure: XXIX Three Man Passing**

### 3.10 COLLECTION OF DATA

The data on the selected visual skill variables namely, dynamic visual acuity, depth perception, arm eye coordination and peripheral vision and the selected performance factors variables namely, speed dribble, dribble and shoot and passing were collected at prior to the commencement of training (pretest) and after twelve weeks of training period (posttest). Both the pre and post tests were administered under identical conditions, with same apparatus, testing personnel and testing procedures.
3.11 ADMINISTRATION OF TESTS

3.11.1 VISUAL SKILLS TEST

3.11.1.1 Dynamic Visual Acuity

DIE Test, Modified Snellen chart

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Figure: XXX Modified Snellen Chart
Purpose

The purpose of this test is measure Dynamic Visual Acuity.

Resource Required

Modified Snellen Chart, Expert Optometrist

Procedure

The Snellen chart placed on wall. The subject sit on the chair 10 feet away facing the chart. Then optometrist moves the subject’s head horizontally at about 2 hz, +- 30 deg excursion obtains visual acuity. This measures visual acuity with the head in motion. Convert the obtain measurement from feet to decimal.

Scoring

The line of the subject read while moving head is measured as score. The score converted from feet to decimal.

3.11.1.2 Depth Perception-

Stereo fly chart test

Figure: XXXI  Stereo Fly Chart
**Purpose**

The purpose of this test is to find out the depth perception

**Resources required**

Stereo fly chart, 3D glass and Stop watch

**Procedure**

The stereo fly chart containing polarized test stimuli for use at 40cm. the subject were polarized lens. There are nine blocks with four circles inside each block. The subject indicates as quickly as possible the circle that appears to be 3D.

**Scoring**

The total score is out of nine. The score is recorded depends upon the subjects indicate the number of blocks the circle appear to be 3D as fast as possible.

**311.3 Arm Eye Co-ordination**

Alternate wall toss test

![Figure: XXXII Alternate wall toss test](image)
Purpose

The purpose of this test is to test the arm eye coordination ability of an athlete.

Resources required

- Tennis Ball
- Stopwatch
- Smooth Wall
- Measuring Tape
- Marker

Procedure

A mark is placed 2 meters from the wall. The subject stands behind the line and facing the wall. The ball is thrown from the right hand in an underarm action to the wall, and caught the ball with the left hand. The ball then thrown back with left hand and caught it with right hand. This cycle of throwing and catching is repeated for 30 seconds.

Scoring

The number of successful catches in 30 second period is recorded.
3.11.1.4 Peripheral Vision

Vision Protractor

![Vision Protractor Image]

**Figure: XXXIII Vision Protractor**

**Purpose**

The purpose of the test is to find out peripheral vision.

**Resources Required:**

- Vision Protractor
- Push Pin
- Colored Object

**Procedure**

Hold the vision protractor up to face level and put nose in the center hole. Assistant hold the colored object perpendicular against the curved side of the protractor, starting at 0°. Assistant move the object slowly and evenly from the edge toward the middle. The subject keeps their eyes on the focus point. Assistant stop moving the object when the subject first detect the object. Note the angle at which subject detected the object. Repeat
Scoring

Average of the three trails recorded as the peripheral vision

3.11.2 PERFORMANCE FACTORS TEST

3.11.2.1 DRIBBLING

Speed Dribble Test

Figure: XXXIV Speed Dribble Test

Purpose:

The purpose of this test is to find out the dribbling speed

Resource required:

- Basketball, 4 cones, Stop watch and Whistle
Procedure

Four cones are placed in a straight line having 15 feet distance with each other. The subjects start from one end of the starting line which is 6 feet long. Dribble around the cones and back to other end of the straight line. And continue the same till 30 seconds.

Scoring

The number of zone passes in 30 seconds counted as final score

3.11.2.2 Dribbling and Shooting

Dribble and Shoot Test

Figure: XXXV Dribble and Shoot Test

Purpose

The purpose of this test is to find out the dribbling and shooting ability of the subject.
Resource required

Basketball, 3 cones, Stop watch and Whistle

Procedure

Three cones arranged in a straight line diagonally from the basket to the right side line of the court. The straight line is 65 feet from the basket. The first cone is 20 feet from the starting line and others are 15 feet apart. The subject dribble around the cones, shoot until the subject makes a basket and dribble back around the cone to the starting line.

Scoring

The time taken to complete the process is counted as score.

3.11.2.3 PASSING

Wall Bounce Test

Figure: XXXVI Wall Bounce Test
Purpose

The purpose of this test is to find out the passing speed of the subjects

Resource required

Basketball, Stop watch, Smooth wall, Whistle and marker

Procedure

A restarting line marks on the floor at the distance of 5 feet from the wall. The subject stands with its toes behind the restarting line. The purpose of this test is to ascertain how long it will take in to do chest pass against the wall and catch it’s 15 times.

Scoring

The time takes to complete 15 chest pass.

3.12. STATISTICAL PROCEDURE

The data obtained from the experimental groups before and after the experimental period were statistically analyzed with dependent 't' test and Analysis of Covariance (ANCOVA). Whenever, the obtained ‘F’ ratio for the adjusted post-test was found to be significant, post hoc test was not applied due to involve of only two groups. In all cases, 0.05 level was fixed as level of confidence to test the significance which was considered as appropriate.