This chapter discuss the methodology used in the selection of subjects, classification of group, experimental treatment, selection of variables, selection of tests, reliability of data, pilot study, experimental design, administration of testscollection of data and statistical techniques were presented.

3.1 Selection of Subjects

The purpose of the study was to investigate the relative effects of resistant training, bodyweight training and their combined training on selected physical fitness components among University men Kabaddi players. Hundred (n=100) men Kabaddi players, who participated in Veer Narmad South Gujarat University, Surat Intercollegiate Kabaddi tournaments during the year 2020-2023, were selected randomly as subjects. The age of the subjects ranged from 18 to 25 years respectively.

All subjects were told about the nature of the study, and their permission to participate was secured until the end of the experiment and testing periods.

3.2 Group classification

100 selected men kabaddi players were randomly divided into four equal groups. The groups and classification are briefly explained in table – 3.1.

Table 3.1 : Classification of Players by Group

Group	Name of the Groups	Total Numbers of players
Experimental Group – I	Bodyweight Training	25
Experimental Group – II	Resistance Training	25
Experimental Group – III	Combination (Combination of body weight training and resistance training)	25
Group – IV	Control Group	25

3.3 Selection of Variables

The investigator reviewed all the available scientific literatures pertaining to the problem under study from books, research papers, websites and also consideration of the feasibility and availability of instrument relevant to the present study the following physical fitness components were selected.

3.3.1 Dependent Variables

- Speed
- Endurance
- Agility
- Flexibility
- Muscular Endurance
- Upper body strength
- Lower body strength

3.3.2 Independent Variables

- Bodyweight Training
- Resistance Training
- Combination (resistance training and bodyweight) Training
- Control Group

The game of kabaddi is a fast body contact sport, which places great physical demands on the body. The success of a kabaddi player depends on physique and fitness. Modern kabaddi players require tremendous speed, agility, explosive power, maximum muscular strength of upper and lower body, endurance, flexibility and muscular endurance of abdominal muscles.

3.4 Experimental Design

The experimental design used in this study was random group design involving one hundred subjects who were divided at random into four groups of twenty five each (n = 25). This study consisted of four independent variables such as bodyweight training, resistance, combination training and control group, the four selected groups, experimental group-I underwent bodyweight training, experimental group-II underwent resistance training, experimental group-III combination training and the group - IV acted as control. All the subjects were tested prior to, and after the 12 weeks training period on selected physical fitness components.

3.5 Criterion Variables

The following tests were chosen for this study by the investigator after examining relevant literature for the study and consulting with specialists in sports science and

physical education. The characteristics of the selected test items were displayed in Table 3.2.

Table 3.2 : Selection of Tests

No	Variables	Test	Units of Measurement
1	Speed	50 m Run	1/100th of a second
2	Endurance	Coopers 12 Minutes Run / Walk	Distance Covered / Meters
3	Agility	Shuttle Run (4 x 10 m)	Time was recorded to the nearest1/100th second
4	Flexibility	Sit and Reach Test	The measurement was recorded in Centimetre
5	Muscular Endurance	One Minute Bend KneeSit-ups Test	Number of correctly Sit-ups in One minute.
6	Upper bodystrength	1RM Bench press	Maximum weight of one full repetition successfully completed is recorded in Kilogram.
7	Lower bodystrength	1 RM SQUAT	Maximum weight of one full repetition successfully completed is recorded in Kilogram.

3.6 Tester Competency

With the assistance of coaches, trainers, and professors of physical education employed by various colleges in south Gujarat, the physical fitness components connected to the investigator carried out this research. The investigator's assistants participated in numerous practice sessions to make sure they were proficient in the proper testing methodology. Test and retest techniques were used to determine the tester's reliability.

3.7 Instruments' Reliability

The necessary equipment was obtained from the M.K. College of Commerce, Bharuch, Department of Physical Education. In terms of functionality, they were

excellent. From reputable and standardized companies, the instruments were obtained. Their calibrations were examined, and it was discovered that they were precise enough to meet the needs of the investigation.

3.8 Reliability of Data

Ten subjects were used in a test-retest method to determine the reliability of the data. The same individuals examined all of the dependent variables selected in the current study twice on the participants under identical circumstances. The reliability of the data was investigated using the Pearson's correlation method; the results are shown in Table 3.3.

Table 3.3 : Scores of Tests and Retests Reliability Coefficient

Sr. No.	Variables	Correlation Coefficient R
1	Speed	83*
2	Endurance	79*
3	Agility	81*
4	Flexibility	82*
5	Muscular Endurance	80*
6	Upper body strength	83*
7	Lower body strength	81*

***r** - 0.05 (10) = 0.58

The correlation on selected physical variables is shown in table 3.3. The data were considered as reliable in terms of subjects because the obtained "R" values were significantly greater than the necessary table value.

3.9 Orientation to the Subjects

A number of sessions were allowed prior to the start of the training so that the participants could become familiar with the methods used to carry out the training exercises. The researcher gave the subjects an explanation of the purpose of the program and their role in the investigation. The investigator provided directions regarding the method to be used by them for measuring while also explaining the process of training and testing on specific criterion variables. Throughout the training and testing period, the individuals had enough motivation to perform at their best.

During the trial period, the control group received no special training and was encouraged not to participate in any form of practice or training program. All of the willing volunteers were informed of the significance and value of the study.

3.10 Training Programme

The experimental groups experienced their different training programs during the training period in addition to their regular study schedules. Group - I underwent resistance training, Group - II underwent bodyweight training, and Group - III underwent a combination of bodyweight and resistance training on alternate days. Group - IV served as the control group.

The total duration of each training session throughout the course of the twelve weeks was roughly between 60 and 75 minutes, including warm-up and cool-down periods. The control group; they didn't take part in any particular equivalence training with the experimental group. All of the participants in this study were closely observed throughout the training regimen to prevent injuries. Throughout the training program, questions about their health status were asked of them. They all stated that they were uninjured. However, muscle soreness started to show up throughout the initial part of the workout regimen and eventually subsided.

3.10.1 Bodyweight Training

In body weight training; exercise were done using your own weight to provide resistance against gravity. While some exercises may require some type of equipment, the majority of bodyweight exercises require none. Group – II would undergoing training for bodyweight exercises for thrice in a week (Monday, Wednesday, and Friday) for total twelve (12) weeks.

- This training was designed to promote increasing strength and flexibility.
- Phase 1 (weeks 1 to 3) were consist of 1-minute sets with 30-second rest periods.
- Phase 2 (weeks 4 to 6) were consist of 1.5-minute sets with 45-second rest periods.
- Phase 3 (weeks 7 to 9) were consist of 2-minute sets with 1-minute rest periods.

- Finally, phase 4 (weeks 10 to 12) were consist of 2.5-minute sets with 90-second rest periods.

Table 3.4 : Bodyweight Training Programme

Days	Week 1-3	Week 4-6	Week 7-9	Week 10-12
Day 1 (Tuesday)	**6 Round of UPPER BODY (Chest & Triceps)** 1 min Tricep Dips1 min Chin Ups 1 min Diamond Push-up1 min Tricep Extension 1 min Decline Push-ups 1 min Push-Ups + Isometric HoldRest 30 secs in between exercises	**6 Round of UPPER BODY (Chest & Triceps)** 1.5 min Tricep Dips 1.5 min Chin Ups 1.5 min Diamond Push-up 1.5 min Tricep Extension 1.5 min Decline Push-ups 1.5 min Push-Ups + IsometricHold Rest 45 secs in between exercises	**6 Round of UPPER BODY (Chest & Triceps)** 2 min Tricep Dips 2 min Chin Ups 2 min Diamond Push-up2 min Tricep Extension 2 min Decline Push-ups 2 min Push-Ups + Isometric Hold Rest 60 secs in between exercises	**6 Round of UPPER BODY (Chest& Triceps)** 2.5 min Tricep Dips 2.5 min Chin Ups 2.5 min Diamond Push-up 2.5 min Tricep Extension 2.5 min Decline Push-ups 2.5 min Push-Ups + Isometric HoldRest 90 secs in between exercises
Day 2 (Thursday)	**6 Round of LOWER BODY (Legs & Lower Back)** 1 min Squats 1 min Split Lunges 1 min Froggers 1 min Front Lunges (Left) 1 min Front Lunges (Right) 1 min Side Lunge (Alternating) Rest 30 secs in between exercises	**6 Round of LOWER BODY (Legs & Lower Back)** 1.5 min Squats 1.5 min Split Lunges 1.5 min Froggers 1.5 min Front Lunges (Left) 1.5 min Front Lunges (Right) 1.5 min Side Lunge (Alternating)Rest 45 secs in between exercises	**6 Round of LOWER BODY (Legs & Lower Back)** 2 min Squats 2 min Split Lunges2 min Froggers 2 min Front Lunges (Left) 2 min Front Lunges (Right) 2 min Side Lunge (Alternating) Rest 60 secs in between exercises	**6 Round of LOWER BODY (Legs& Lower Back)** 2.5 min Squats 2.5 min Split Lunges 2.5 min Froggers 2.5 min Front Lunges (Left) 2.5 min Front Lunges (Right) 2.5 min Side Lunge (Alternating)Rest 90 secs in between exercises
Day 3 (Saturday)	**6 Round of CORE / ABS** 1 min Elbow Plank 1 min Side Plank (Left) 1 min Side Plank (Right) 1 min Glute Bridge Swings1 min Leg Raises 1 min V-ups Rest 30 secs in between exercises	**6 Round of CORE / ABS** 1.5 min Elbow Plank 1.5 min Side Plank (Left) 1.5 min Side Plank (Right) 1.5 min Glute Bridge Swings 1.5 min Leg Raises 1.5 min V-ups Rest 45 secs in between exercises	**6 Round of CORE / ABS** 2 min Elbow Plank 2 min Side Plank (Left) 2 min Side Plank (Right) 2 min Glute Bridge Swings2 min Leg Raises 2 min V-ups Rest 60 secs in between exercises	**6 Round of CORE / ABS** 2.5 min Elbow Plank 2.5 min Side Plank (Left) 2.5 min Side Plank (Right) 2.5 min Glute Bridge Swings 2.5 min Leg Raises 2.5 min V-ups Rest 90 secs in between exercises

3.10.2 Resistance Training

In resistance training; any exercise of a muscle or muscle group were performed against external resistance. The external resistance can be dumbbells, barbells, rubber exercise tubing, bricks, medicine ball or any other object that causes the muscles to contract. Resistance training Group - I would go for resistance training exercises for three days in a week i.e. Tuesday, Thursday and Saturday for total twelve (12) weeks.

- The group performed 60% of 1 RM for the first three weeks (1-3) when doing the selected resistance exercises. The subjects completed one set of 8 repetitions for each exercise.
- The group performed 65%of their 1RM for the second three weeks (4-6) of the resistance workouts they had selected.The subjects completed two sets of 10 repetitions for each exercise. Each set was followed by a 2-minute recuperation period.
- The group performed in the selected resistance exercises for the third three weeks (6-9) at 70% of 1RM.The subjects completed two sets of each exercise with 10 repetitions each. Each set was followed by a 2-minute recuperation period.
- The group performed 75% of their 1RM for the final weeks (9-12) of resistance training. The subjects completed two sets of 12 repetitions for each exercise. Every set had a 2-minute recovery period in between.

Table 3.5 : Resistance Training Programme

Week	Intensity	Repetitions	Set	Recovery
1-3	60% 1RM	08	1	1 Min
4-6	65% 1RM	10	2	2 Min
7-9	70% 1RM	10	2	2 Min
9-12	75% 1RM	12	2	3 Min

- The warm up with barbells, clean and lift, clean and press and stretching exercises were done with the self-interest and capability or necessity of the subjects.
- Exercises involving the upper body, lower body, and trunk were performed duringthis training with a fixed load.

- Exercises including; barbell curls, military press, bench press, dumbbells exercise, deep squat, hamstring curl, leg press, leg extension, medicine ball etc.

3.10.3 Combination of resistance training and bodyweight training

Combination of bodyweight training and resistance training Group- III would go for bodyweight training for three days (Monday, Wednesday and Friday) in a week for first six (06) weeks for training along with bodyweight training Group- I. Remaining six (06) weeks Group- III would gone for resistance training for three days (Tuesday, Thursday and Saturday) in a week along with resistance training Group- II.

3.11 Collection of the Data

The data were collected on the selected physical fitness components as per the methods described above. The pre-test data were collected prior before the training programme and post-test data were collected immediately after the twelve weeks of bodyweight, resistance and combination of bodyweight and resistance training from three experimental groups and a control group.

3.12 Administration of Test

- **Speed**

  Test - 50 m Run

  Purpose - The test was to determine the player'smaximum speed and the ability to accelerate from a standing position.

  Equipment - Stop watch, marking cones and measuring tape.

  Procedure–The participants were instructed to begin standing behind the starting line. They were instructed to begin running by saying the words "Ready" and "Go" while clapping by the clapper. The stopwatch was activated simultaneously. The timer was stopped when the subject crossed the finish line after running as quickly as possible. Only one trial was permitted.

  Scoring -The score was the duration of time, measured in $1/100^{th}$of a second, that passed between the start of the race and when the subject crossed the finish line.

- **Endurance**

  Test - Coopers 12 Minutes Run / Walk

Purpose - The purpose of the test was to evaluate cardio-respiratory endurance of the each subjects.

Equipment -A track of 400 meters with inner and outer markings, cones, measuring tape, and a stopwatch.

Procedure – After the 400 m track had the requisite markings applied, cones were placed 20 mts apart on either side of the track to make estimating the distance easier. Individual or group running was required of the participants. They were instructed to cover as much ground as they could during the test while pacing was given first emphasis. The exam administrator should orally indicate the 3, 6, and 9 minute mark in order to encourage students.The test administrator meticulously counted the laps each participant completed during the 12 minute test time. The test administrator gave the participants the signal to halt running and wait on the spot by blowing a whistle at the conclusion of the testing time. Each subject's covered distance was noted by the administrator.

Scoring - The distance covered by the subjects in 12 minutes was recorded in meters.

- **Agility**

Test -4 x 10 m Shuttle Run

Purpose - The purpose of the test was to evaluate each subject's level of agility.

Equipment - Flat surface of 10 m with two parallel lines on both sides, wooden blocks, whistle and stop watch.

Procedure – The 10 m-long flat surface was marked with parallel lines on both sides. The wooden blocks should be put behind any one of the lines. The test subjects were instructed to take a position at the end of another line. When the whistle blew, the subjects sprinted as quickly as they could to the other side of the line to pick up one block, return to the starting line, and then keep the block on the ground behind the line. After placing the block, you immediately went back to get another one before sprinting across the starting line. The score was the amount of time between the first signal and when the subject crossed the starting line.

Scoring - The time was recorded as the score in $1/100^{th}$ of a seconds.

- **Flexibility**

  Test - Sit and Reach

  Purpose - The purpose of this test is to monitor the development of the athlete's lower back and hamstring flexibility.

  Equipment - A 'Sit and Reach Table'

  Procedure – The subject sat in front of the box with both legs extended forward. The measuring stick was placed on the box in-between both the hands. The zero end of the measuring stick was placed as proximal end. The subject bent forward and extends both arms forward. The zero point of the measuring stick was placed to the tip of the middle finger. The subject slowly stretches forward the hip, back and the arm. The maximum distance reached was recorded with the help of measuring stick in centimetres. Three trials were given with adequate rest in between. The best of the three trials was treated as the final score.

  Scoring -Maximum of reading taken by the students was recorded in centimetres.

- **Muscular Endurance**

  Test –One Minute Bend Knee Sit-ups Test

  Purpose - The purpose of the test was measures the strength and endurance of the abdominals and hip-flexor muscles.

  Equipment - Exercise mat, stopwatch

  Procedure – The subjects were asked to execute the sit-ups in supine position with knee were flexed at 90° with the feet held flat on the floor. The hands were placed behind the head. A helper will be used to hold the feet down. When the subject was ready, he performed sit-ups by rolling the trunk of the floor until the chin touches the knees. A subject was not allowed any rest in between sit-ups during his performance. The subjects were then returns to the supine position by uncurling. The subjects kept repetition continue until time has elapsed. Only one trail is given.

  Scoring: One point was scored for each correctly performed sit-up. The maximum numbers of sit-ups completed in one minute time were recorded.

- **Upper Body Strength**

  Test - 1RM Bench press

  Purpose –The test was measure maximum strength of the arm, shoulder and chestmuscle groups.

Equipment -A barbell, weight plates, safety locks and bench press bench.

Procedure – Depending on the group being evaluated, the bar is set to the proper weight. The athlete starts out by lying on the bench in a supine position with their feet flat on the ground and their upper and lower backs constantly in touch with the bench. To ensure that the elbows are at right angles at the lowest position, the bar is grasped at a distance that is around 6 inches wider than shoulder width. A successful lift is considered complete when it moves the weight from its beginning position with the arms fully extended and immediately above the chest to its final position with the weight barely touching the chest before returning to the starting position. The weight should continue to be in line with the nipples, and the bar should move smoothly and at a controlled speed.

Scoring - The highest weight for a repetition that is successfully completed is recorded.

- **Lower Body Strength**

Test - 1RM Squat

Purpose –The test was measure maximum strength endurance of the leg muscle groups.

Equipment -A barbell, weight plates and squat rack

Procedure – The bar was set to the proper weight. Standing comfortably, the athlete spreads his legs to around shoulder width. Step under the bar with the feet parallel to the ground and grasp the bar with a closed, pronated grip. In either a low bar position or a high bar position, balance the bar on your upper back and shoulders. Once in this posture again, extend the hips and knees to elevate the bar by lifting the elbow, keeping the chest up, and tilting the head slightly upward. Take one or two steps backward after raising the bar, then squat while keeping your feet shoulder-widthapart and your toes pointing slightly outward.

Scoring - The maximum weight of one full repetition successfully completed isrecorded.

3.12 Statistical Technique

To estimate the effect of resistance training, bodyweight training and their combination on selected physical fitness components the following statistical techniques were used.

Analysis of covariance (ANCOVA) statistical technique was used to test theadjusted post-test mean differences among the experimental groups. If the adjusted posttest result was significant, the Scheffe's post-hoc test was used to determine the significance of the paired mean differences. The level of significance was set at $p<0.05$ of all the cases.