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Correlation of lower quarter Y balance test with agility T test and RAST in collegiate athletes

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Abstract

Background: Dynamic balance, agility, anaerobic power and capacity, recreation time all are skill-related component of physical fitness which requires in sports like handball, soccer, basketball, cricket, tennis. There are various types of tests to assess these entire components. The purpose of this investigation is to examine correlation of LQYBT with T test and RAST as a component of leg power, leg speed, dynamic balance and agility. Here we used LQYBT, T test and RAST to assess dynamic balance, agility, and anaerobic power and capacity respectively.

Aim of the study: The aim of this study is to find out correlation of YBT with agility T test and RAST in collegiate athletes

Materials and Methods: 59 recreational collegiate athletes of different sports (soccer, handball, basketball, cricket, and hockey) participated in this research. Their mean age was 20.483 years. All participates has performed YBT, T test, and RAST. Dynamic balance, agility, and anaerobic power and capacity are assessed by LQYBT, T test and RAST respectively. Each participant will perform four test trials in which first two trials stands for familiarization and last two stands for statistical analyses. In which dynamic balance is measured by distance and other two component id measured by time. In T test, less time indicates greater agility. Pearson correlation is used to find correlation of YBT with T test and RAST.

Results: Present study shows positive correlation of YBT (RT) and RAST with the Pearson co-efficient of ($r=0.406$). Positive correlation found between YBT (RT) and T test with the correlation co-efficient of ($r=0.375$). Positive correlation fond between YBT (LT) and RAST with coefficient value $r=0.480$ and positive correlation found between YBT (LT) and T test with coefficient value $r=0.303$.

Conclusion: Investigation indicates that there is a positive correlation between YBT and RAST and also find positive correlation between YBT and T-test. So that YBT, agility T-test and RAST are the reliable tests to assess the dynamic balance, agility and anaerobic power and capacity.

Keywords: Dynamic balance, agility, anaerobic power and capacity

Introduction

Any bodily movement produced by skeletal muscle which results in energy expenditure is called as physical activity^[1]. As per physical activity, exercise, and physical fitness: definition and distinctions for Health-related research there are mainly two components of physical fitness: 1) health-related fitness and 2) skilled-related fitness^[2]. Health-related fitness contains cardiorespiratory endurance, muscular endurance, muscular strength, body composition, flexibility. Whereas agility, balance, coordination, speed, power, reaction time comes under the skill-related category which shown in figure (1)

Many field sports such as soccer, handball, basketball, hockey, cricket, and tennis requires sudden change in direction throughout the game in response to a stimulus, according to as an opposing player's movements or the movement of the ball.² Field sports players require to move faster and change in direction more quickly while maintaining control these can be achieved by working on agility and by improving balance and coordination^[3].

There are two main components of agility: 1) change of direction speed 2) perceptual and decision-making factors. There are other sub-components of these two components which are shown in (figure 2)^[13].

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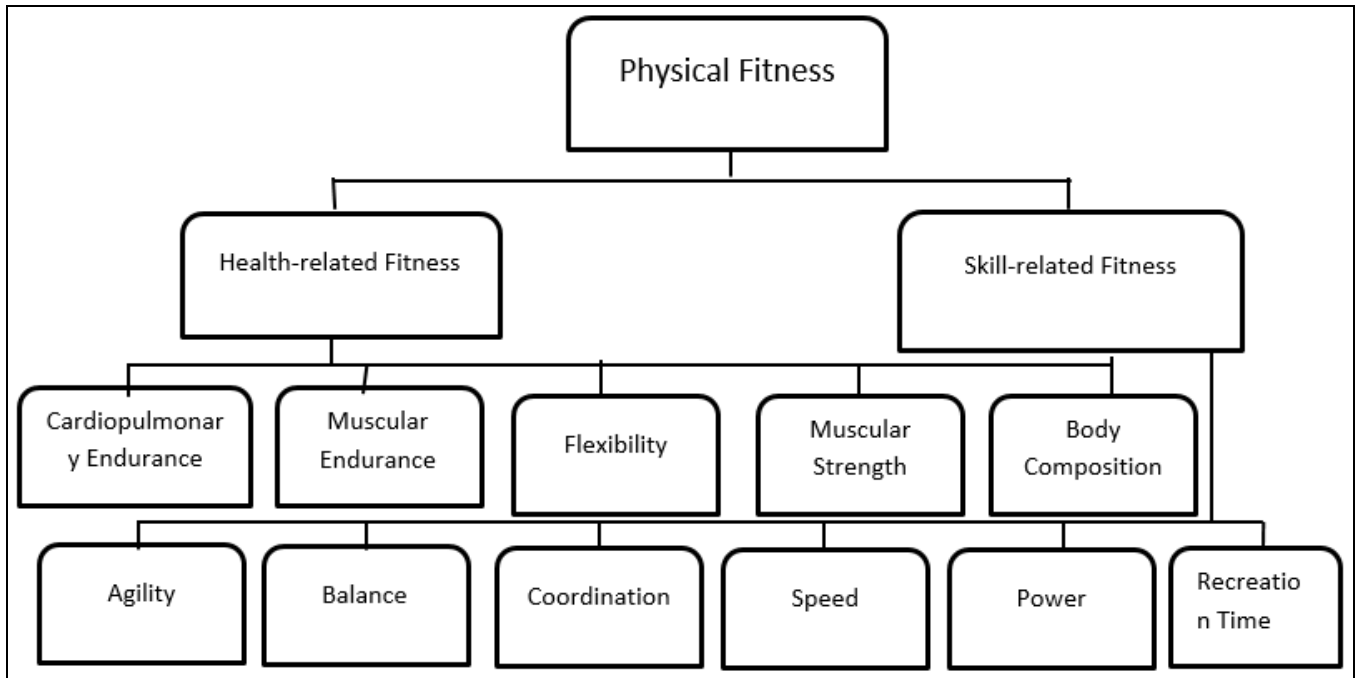


Fig 1: Components of Physical Fitness

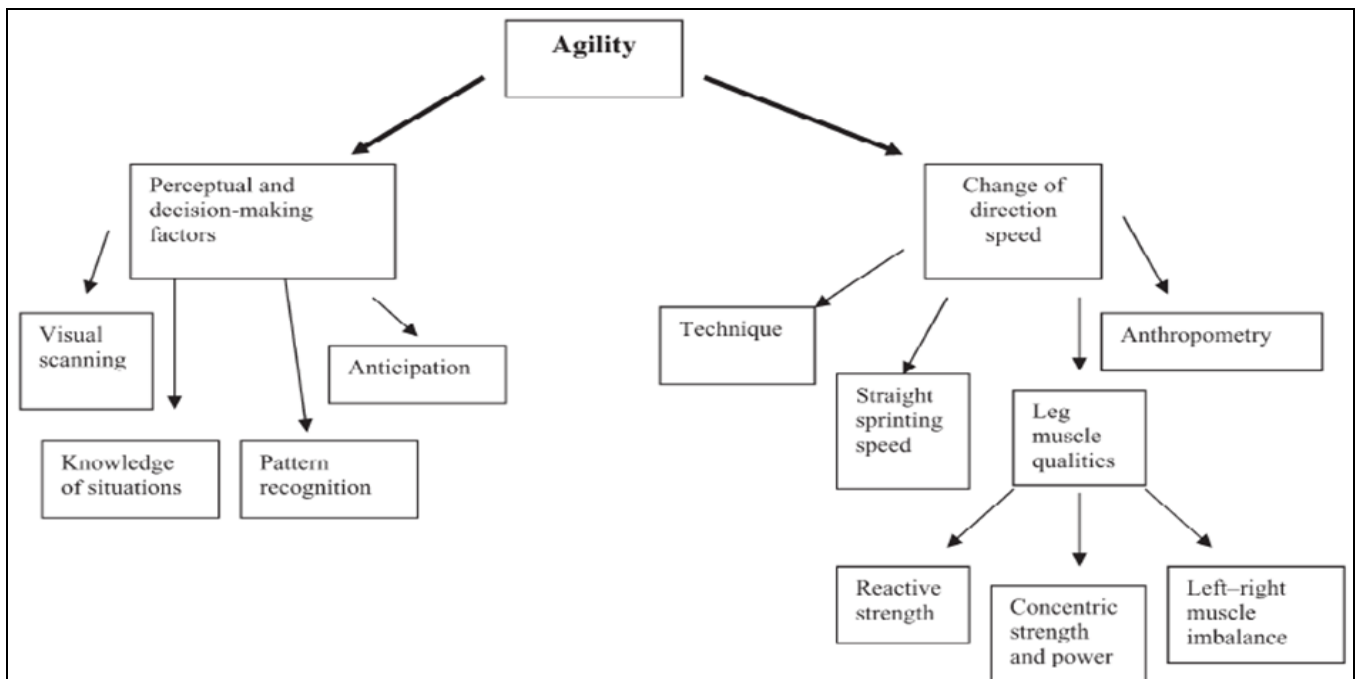


Fig 2: Components of Agility

The Illinois test, the 505 test, the T test, the L-run test, the zigzag test these are tests are used assess agility but the most commonly used is T test. It is well accepted as a standard of agility [2]. Individual's ability to maintain total body stability of the center of mass during movement is known as Dynamic balance [4]. Dynamic balance is an ability to maintain stability of the center of mass while individual is moving. It is an important component to examine the risk of injury [5]. Lower Quarter Y balance test is used to assess dynamic balance in athletes which is the modification of star excursion balance scale [4]. Y balance test was developed to standardize the performance of the test and to improve measurement repeatability [6].

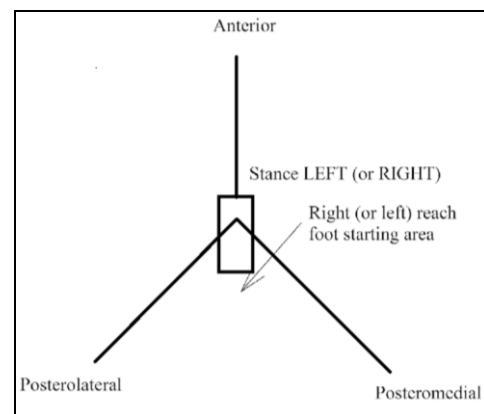


Fig 3: Diagram of Lqybt

In team field sports such as football, tennis player should have an ability to produce high rates of power output and to sprint at high velocity. Distance covered in match is less than 10% by sprinting [7]. There are different method to measure the power, capacity of the muscle energy production in the anaerobic pathway [8]. RAST is developed by Draper and Whyte in 1997. The test involves six sprints of 35m distance.

10 second recovery time should be given in between each sprint [9]. RAST is the simplest method to measure anaerobic power and capacity, this test requires only a stopwatch and a calculator [10]. RAST is use to assess anaerobic power and capacity, peak power, mean power, fatigue index [8]. The result of RAST give idea of the neuromuscular and energy determinants of maximal anaerobic performance.

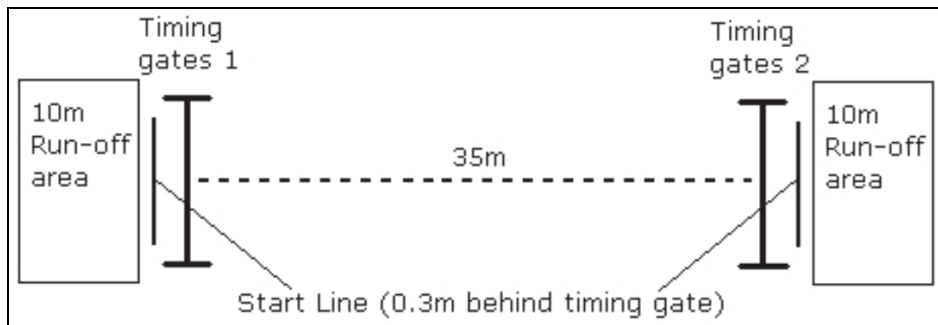


Fig 4: Diagram of Rast

Methodology

The objective of the study was to determine the relationship between LQYBT with T-test and RAST among different sports players from UTU. A total of 30 participants were taken from UKA Tarsadia University for the research. Population will be taken in between the age groups of 18 to 30 years. Inclusion criteria for the participant are students who belong to the sports team of any kind of sports from last 2 years. There should not be any history of ankle sprain injury since last 6 months. Exclusion criteria for the participants are none of them should be highly trained athletes. For the present study we have used the convenient sampling method. The outcome measures of our study were Lower Quarter Y Balance Test, T-test and Running based Anaerobic Sprint Test.

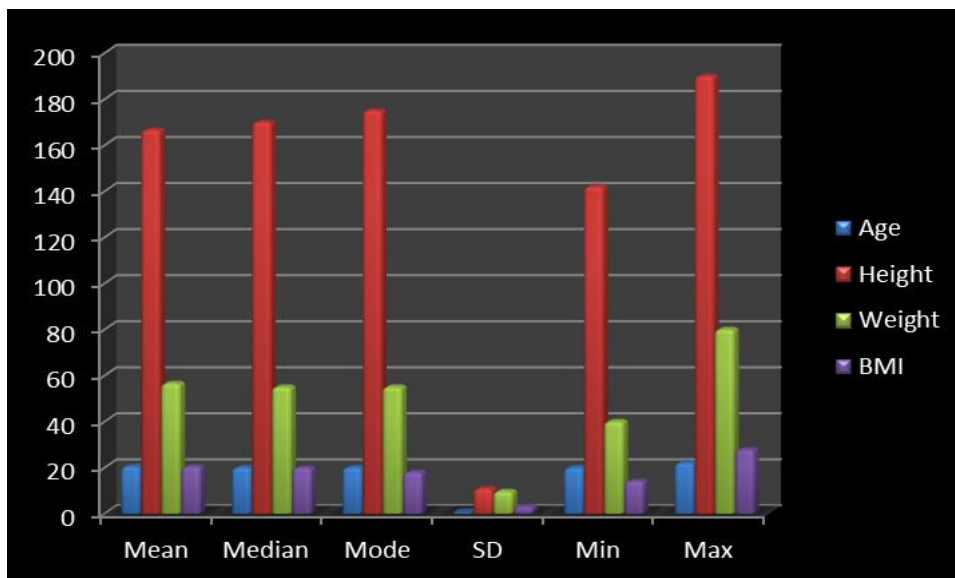
Procedure

All tests were performed on the sports ground. We gave 15

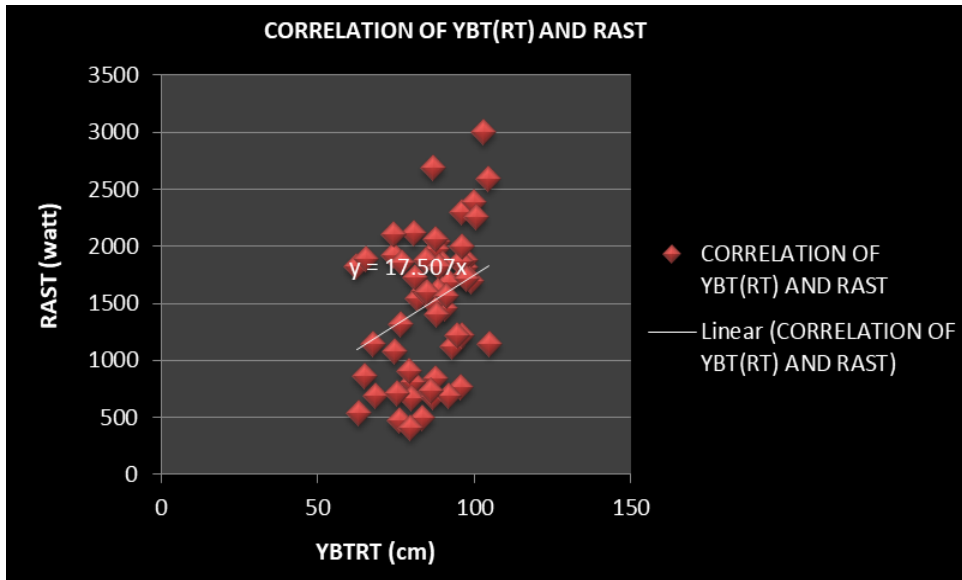
minutes for warm-up including jogging, lateral displacements, dynamic stretching, and jumping before testing. We have given 3 minutes of rest between all the trials and 5 minutes of rest between all the tests for the adequate recovery. LQYBT performances score will be recorded by measuring distance. T-test and RAST performances will be recorded by using stopwatch.

Statistical analysis and Results

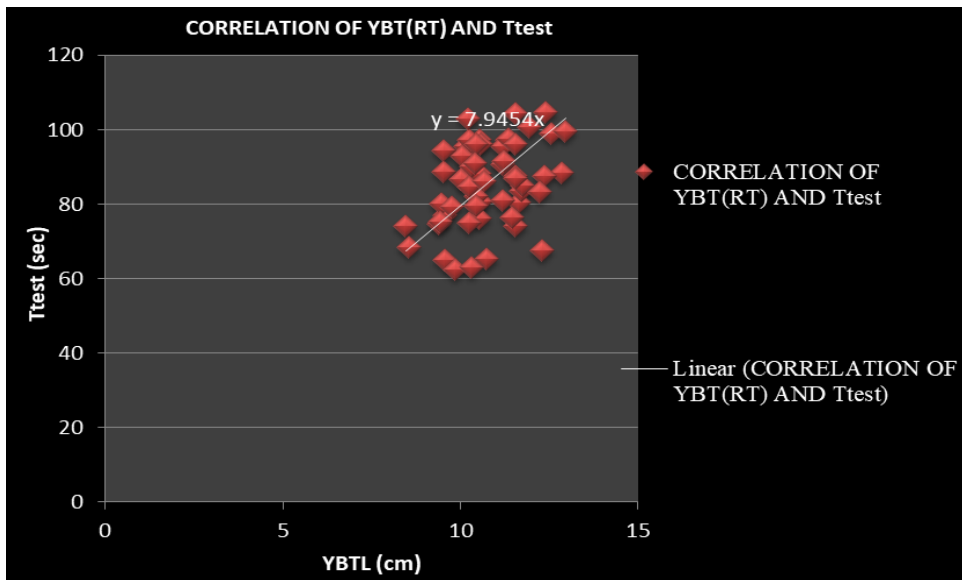
After collecting data, analysis was done to derive conclusion regarding the correlation of LQYBT with agility Ttest and RAST in collegiate athletes. Mean age of participant was 20.483±0.6226. Three tests were performed by all participants to assess dynamic balance, agility, and anaerobic power and capacity. SPSS software version 22.0 was used for statistical analysis. Pearson correlation was the method to find correlation among these tests Level of significant was set p<0.05.



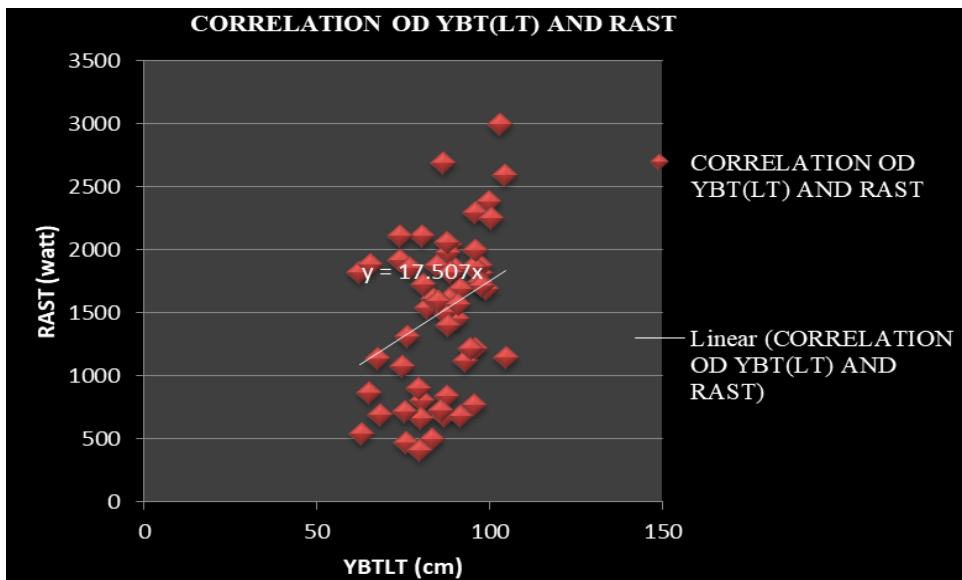
Graph 1: Baseline data



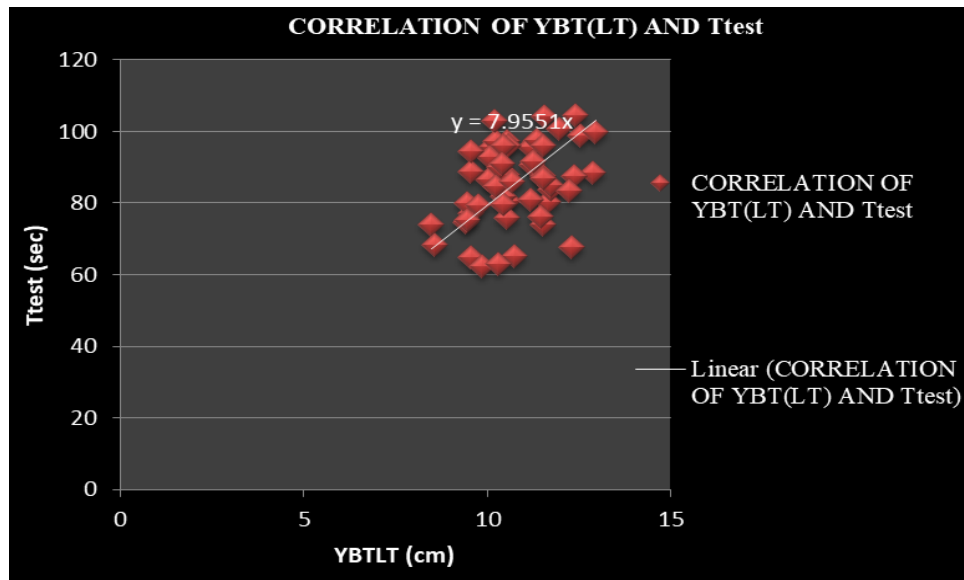
Graph 2: Correlation of YBT (RT) and RAST



Graph 3: Correlation of YBT (RT) and T Test



Graph 4: Correlation of YBT (LT) and RAST



Graph 5: Correlation of YBT (LT) and T test

The baseline was obtained from demographic data of Age, height, weight, and BMI. Positive correlation was obtained between YBT (RT) and RAST with the Pearson co-efficient of ($r=0.406$). Positive correlation was obtained between YBT (RT) and T test with the Pearson co-efficient of ($r=0.375$). Positive correlation was obtained between YBT (LT) and RAST with the Pearson co-efficient of ($r=0.480$). Positive correlation was obtained between YBT (LT) and T test with the Pearson co-efficient of ($r=0.303$). These all are statistically significant at ($p < 0.05$).

Discussion

Purpose of this study was to find correlation of LQYBT with agility T test and RAST as a component of leg power, leg speed and balance. This study shows linear positive correlation of LQYBT and RAST and LQYBT and T-test. Michele A. Raya, *et al.* conducted a comparative study on finding the comparison of three agility tests with male service members: Edgren side step test, T-test and Illinois agility test done by Purpose of this study was to examine the reliability and validity of all these three agility tests. Results showed that there was an excellent inter-rater reliability and moderate to good test retest reliability.¹¹ Agility T test shows excellent inter-rater reliability and test retest reliability, on the basis of reliability article T-test is used in present study to assess agility in collegiate athletes. Dong-Kyu Lee, *et al.*, done study on relationship among Y balance test, Berg balance scale and lower limb strength in middle aged and older females. No study has been done on finding correlation of YBT as an assessment tool for dynamic balance with agility and anaerobic power and capacity, respectively. Aim of present study is to examine correlation with YBT with agility T-test and RAST in recreational athletes as a component of leg power, leg speed and dynamic balance⁶. Phillip J. Plisky, *et al.* conducted a study to find out the reliability of an instrumented device for measuring components of the star excursion balance test. Purpose of this study was to report the development and reliability of the Y balance test. study suggest that YBT is a reliable test for measuring single limb stance excursion distances while performing dynamic balance testing in collegiate players.¹² On the basis of this study, YBT is used to assess dynamic balance in collegiate athletes in our present study. Aquino R, Palucci Vieira LH, *et al.*, conducted a study on relationship found between field tests and match

running performance in soccer player. Field tests were maximum speed (10m-30m), zigzag, running based anaerobic sprint test and Yo-Yo intermittent recovery test level 1. The results showed that the majority of field tests were not related to match running performance¹⁴. Very few researches are done RAST and its correlation with other tests. RAST is used in present study to assess anaerobic power and capacity and investigate correlation with YBT.

So the present study showed that there was positive correlation between LQYBT with RAST and T test. It showed that LQYBT, T test and RAST equally important to improve the dynamic balance, agility and anaerobic power of the university recreational players.

Clinical Implication

As results shows positive correlation of LQYBT with RAST and T test, study suggests that all these three tests can be used in assessment of agility, dynamic balance and anaerobic power and capacity. Dynamic balance with agility and anaerobic power and capacity are directly proportional to each other so that both should be equally given importance in field sports training.

Future Scope

Future research with large sample size may be conducted with the different age group and with the sports specific athletes to determine the correlation between YBT with T test and RAST.

Conclusion

Investigation indicates that there is a positive correlation between YBT and RAST and also find positive correlation between YBT and T-test. So that YBT, agility T-test and RAST are the reliable tests to assess the dynamic balance, agility and anaerobic power and capacity in recreational players.

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