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# AN OBSERVATIONAL STUDY ON BALANCE AND AGILITY IN RECREATIONAL BADMINTON PLAYERS

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## ABSTRACT

**Background**:Balance and agility are required for badminton players for maintaining their center of gravity, line of gravity andalso ability to change from one position to another. The aim of the study is to study the balance and agility in recreational badminton players.

**Objective**: To evaluate balance in recreational badminton players by using functional reach test and agility in recreational badminton players by using hexagon agility test.

**Methodology**:An observational study of 150 male and female subjects of age group 18-25 years were included in the study.

Outcome measures: Balance is tested by using functional reach test and agility is measured by using hexagon agility test.

**Result**:Among males, majority of them falls under the category of above average with 35.8% and the results and among females 67.0% are under above average category for hexagon agility test and majority of the (48.7%)subjects are under low balance category in functional reach test.

**Conclusion**:This study concluded that balance in recreational badminton players is low (48.7%) by functional reach test and in hexagon agility test both males(35.8%) and females(67.0%) are having above average agility.

INTRODUCTION

Badminton is one of the most fastest movement sports which requires balance and agility to maintain position. The player has to move forward and backward in the direction of shuttle cock and adjust their body position rapidly and continuously throughout the game. The player has to maintain their LOG and COG with in the BOS while performing the movement.[1]

Balance plays crucial role in badminton players as a players moves forward to lift the shuttle cock which falls before the net by lunging with single leg and also when he has to lift the shuttle cock in back box which requires balance ability of that particular players.[2]In short, badminton is characterized by jumping, stepping and quick movements. Badminton players balance ability is under the influence of these combined movement pattern.[2]

Agility is defined as a rapid whole body movements with change of velocity and direction in response to a stimulus, which is much required in badminton.[1]

It is the ability to change direction quickly in small distance in both defending and attacking shots in badminton competition.[1]

Sprains and strains are most common in badminton which may be due to ankle instability or improper balance and poor agility.[2]

Balance is a generic term used to describe the dynamic process by which the body's position is maintained in equilibrium. It means that the body is either at rest(static) or in steady state(dynamic) motion. Balance is greatest when the body's COM/COG is maintained over its base of support(BOS).[3,4]

COG: It refers to the vertical projection of the COM to the ground. In anatomical position, the COG of most adult humans is located slightly anterior to the 2nd sacral vertebrae/ approximately 55% of a person's height.[5]

COM:It is a point that corresponds to the center of the total body mass and is the point at which the body is in perfect equilibrium. It is determined by finding the weighted average of the COM of each body segment[5]

BOS: It is defined as the perimeter of the contact area between the body and its support surf, foot placement alters the BOS and changes a person's postural stability.[5]

A general definition of agility that is accepted by many sports scientists presents the agility skill as "a rapid whole body movement with modification of running direction in response to a stimulus"(Van Gelder & Bartz, 2011).[6]

The agility skill implies the movement of the entire body or only of the upper or lower body segments to rapidly change the running direction without losing precision balance(Allum et al., 2002).[7]Agility is the ability to maintain and regulate correct positions of the body while rapidly changing direction through a series of movements. This skill is a determinant of sports success in field and court competition, demonstrated by analysis of time-motion, evaluation of testing batteries for elite and non-elite athletes, and coaching analyses for different team sports.[8]

Agility skill requires the ability to perceive and respond rapidly and accurately to relevant information about opponent's movements. Owing to its various embodiments(forward-backward, rotational, lateral, etc.), agility is challenging to generally develop through strength and conditioning training.[8]

## NEED OF THE STUDY

- There is limited research regarding the inadequate balance and agility which results in ankle sprains or strains.
- There is need to evaluate whether low balance and agility in recreational badminton players results in ankle instability.
- As badminton player wants to run front, back and sides quickly to reach the shuttle cock, they require balance and agility if not properly aware there might be chance of exposing to a sprains or strain which shows impact on their day today life.
- So, this study may help the badminton players to have proper balance and agility in prevention of sprains or strains.

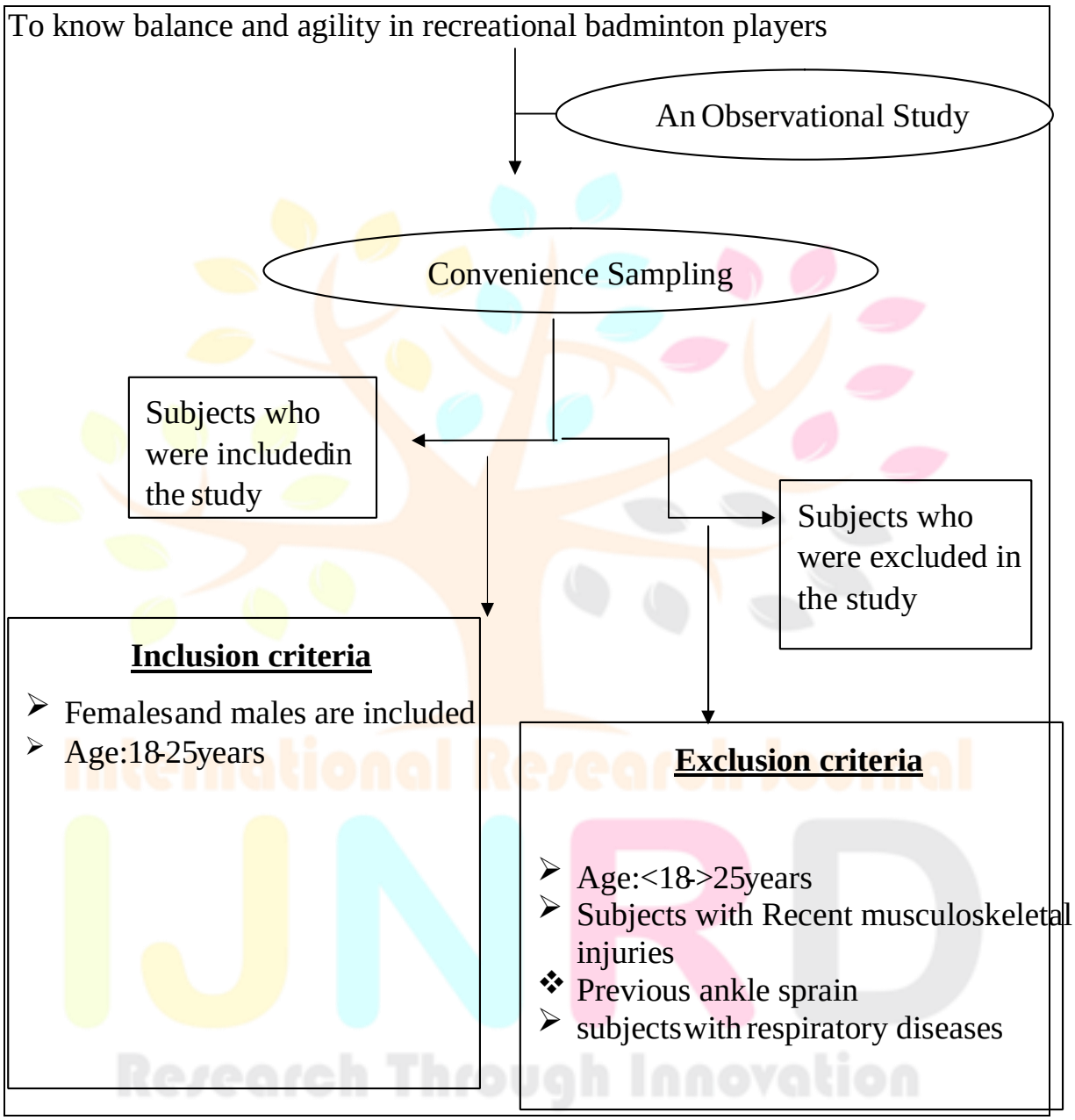
# AIM OF THE STUDY

An observational study on the balance and agility in recreational badminton players.

# OBJECTIVES OF THE STUDY

- To evaluate balance in recreational badminton players by using functional reach test.
- To evaluate agility in recreational badminton players by using hexagon agility test.

## Study algorithm




# MATERIALS AND METHODS **Materials**

1. Measuring scale
2. Stopwatch
3. Chalk piece.
4. Measuring tape

# Methods

- Study design: observational study
- Sample design: convenience sampling
- Sample size: 150
- **SAMPLE SIZE FORMULA**: $\frac{(\text{Z-score})^2 \text{x standard deviation x(1-Standard deviation)}}{(\text{margin of error})^2}$
- Study duration :4 months (April-august,2022)
- Study setup: SVIMS, College of Physiotherapy and Physical education department, Sri Venkateswara University, Tirupati

## Inclusion criteria

- Age: 18 -25 years
- Both genders- males and females.

## Exclusion criteria

- Age above 25 years and below 18 years
- Recent musculoskeletal injuries
- Previous ankle sprain.
- Respiratory diseases

An observational study was conducted on 150 subjects (males and females) aged between 18-25 years. The subjects were explained about the need and objectives of the study and were selected according to their acceptance and were given informed written consent to participate in the study.

- The subjects were explained about the functional reach test first and collected data for 10 subjects a day for 15 days and the data was recorded alternately.
- From the next day, hexagon agility test was conducted for 5 subjects a day for 30 days.

# FUNCTIONAL REACH TEST:

## Purpose

- The functional reach test measures dynamic balance. outcome
- Distance reached in centimeters or inches

**Equipment needed**

- Measuring stick; adhesive tape
- Before beginning of the procedure adhesive tape is used and a measuring stick is secured horizontally on a wall at a height approximately in line with the subject.

## Protocol:

1.Subject is asked to remove the shoe and ask to reach with their arm if they are ready to measure their ability.

2.Now the subject is made to standing with their back straight and feet shoulderwidth apart and shoulders perpendicular to the wall to adjust their body so that their arms are straight ahead, with their fingertips are located at the zero end of the measuring stick.

3. After that subject is made to reach along the stick as far as possible withoutlosing their balance and score is recorded.

4. After completion of two more attempts, greatest length achieved by thesubject along the measuring tape is taken and was noted.

Figure 1:Descriptive values for FRT for men

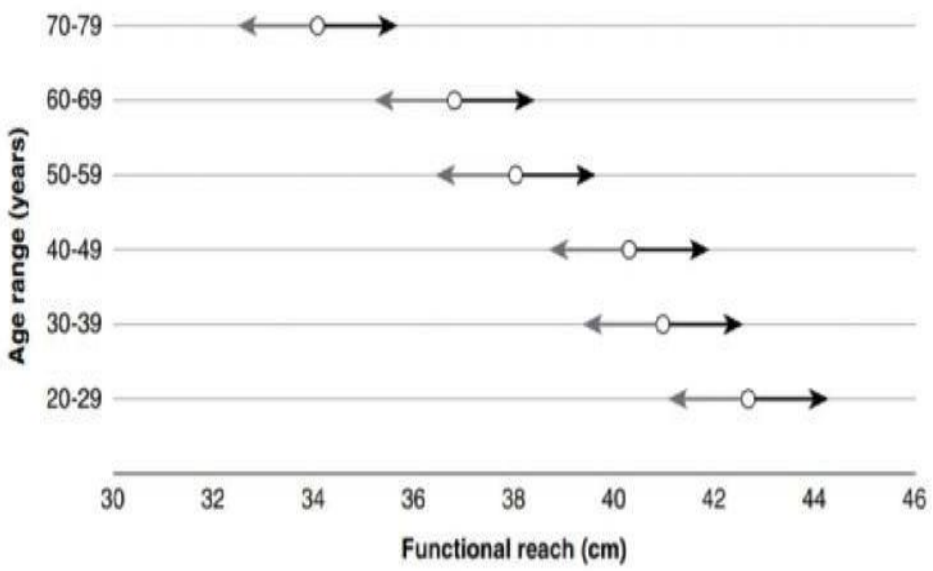



**Figure 2: Descriptive values for FRT for women**

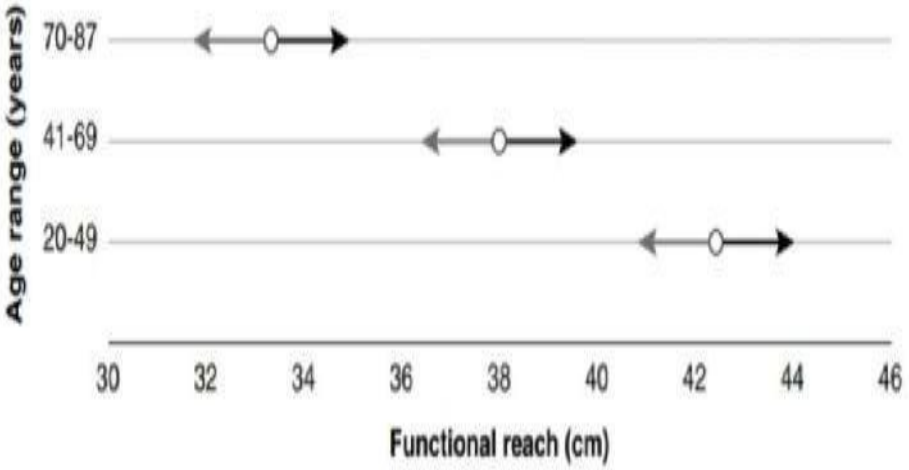


**Figure3:Position for FRT**

## HEXAGON AGILITY TEST:

### Purpose:

The hexagon agility test measures multidirectional speed and planned change of direction during jumping.

### Outcome

Time, in seconds, needed to complete the required movement pattern

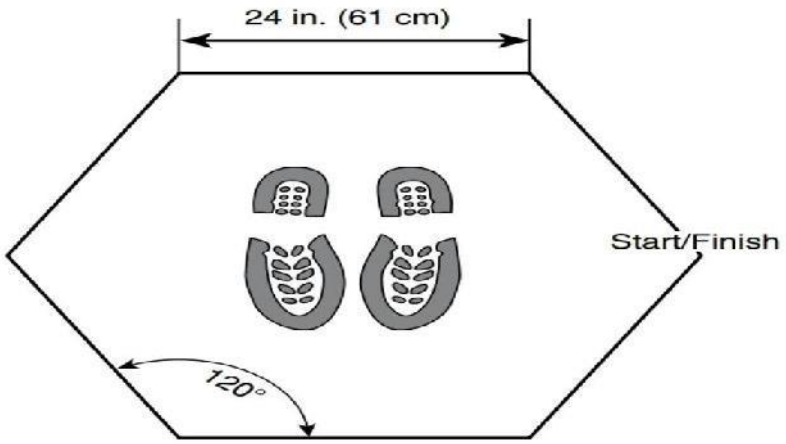
### Equipment needed

Cones or markers; adhesive tape or field paint; timing device; measuring tape; goniometer or protractor.

## Procedure

- The aim of the hexagon agility test is to test the ability to jump quickly while maintaining the balance. The equipment used is a measuring tape, a drawn hexagon(with 6 sided of 60cm long) on the ground and a stopwatch.
- The procedure of the test goes like the subject starts with both legs together in the center of the hexagon with the face to the frontline.
- At the start command, the subject must jump across the hexagon line then back in the center and then, the subject hasto complete a 3 full tour of the hexagon. (clockwise and anticlockwise )

**Figure 4**: Hexagon agility test setup




Setup for the hexagon agility test.

**Table 1**: **Normative data of hexagon agility test**[34]

| Gender | Excellent | Above Average | Average | Below Average | Poor |
|---|---|---|---|---|---|
| Male | <11.2 secs | 11.2 - 13.3 secs | 13.4 - 15.5 secs | 15.6 - 17.8 secs | >17.8 secs |
| Female | <12.2 secs | 12.2 - 15.3 secs | 15.4 - 18.5 secs | 18.6 - 21.8 secs | >21.8 secs |

## STASTICAL ANALYSIS

The collected data was entered into Microsoft excel and statistical analysis was done by using SPSS 29.9 version.

The analysis has been performed to know the agility and balance in recreational badminton players by using hexagon agility test and functional reach test.

A total of 150 subjects (both males and females) were participated in this study of which 53 are males and 97 are females.The mean age group of subjects is 21.750 for females and 21.38 for males.

**Table 2**:Gender distribution

| Males | Females | Total |
|---|---|---|
| 53 | 97 | 150 |

**Table 3**: Scores of males in HAT

| | **Hexagon agility test in Males** | |
|---|---|---|
| | Frequency | Percent |
| Excellent | 13 | 24.5 |
| Above a erage | 19 | 35.8 |
| Aver ge | 15 | 28.3 |
| Below a erage | 6 | 11.3 |
| Tota | 53 | 100.0 |

## Tables

The table consists of male subjects in hexagon agility test. The 13 male subjects (24.5%) are under the category of excellent and 19 subjects (35.8%) are above average and 15 (28.3%) are under average category and 6 (11.3%) are below average.

Figure 5: Graphical representation of values of HAT in males

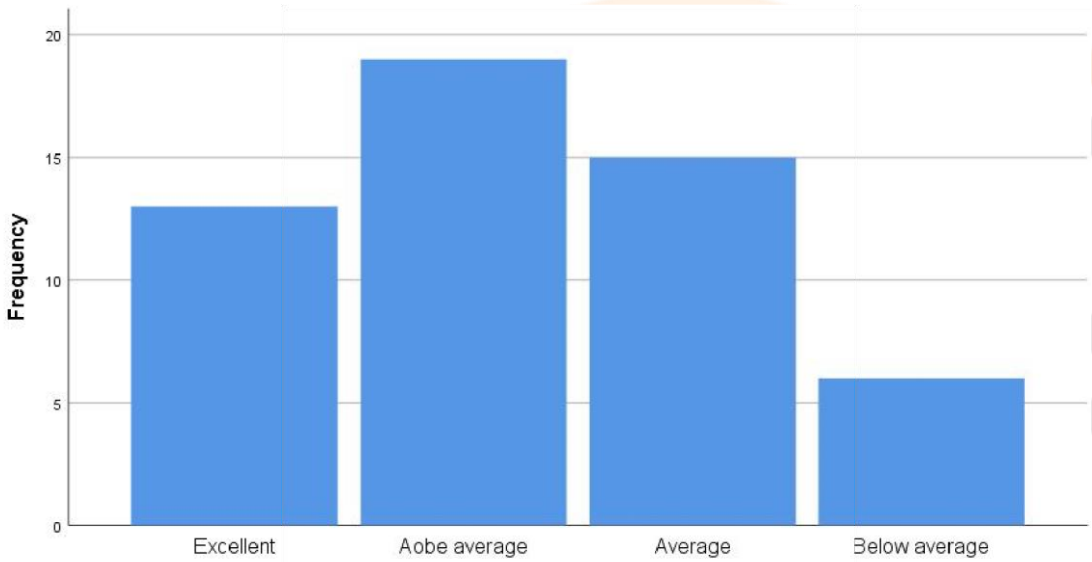


**Table 4**: Scores of HAT in females

| | **Hexagon agility test in females** | |
|---|---|---|
| | **Frequency** | **Percent** |
| Excellent | 7 | 7.2 |
| Above average | 65 | 67.0 |
| Average | 14 | 14.4 |
| Below Average | 7 | 7.2 |
| Poor | 4 | 4.1 |
| Total | 97 | 100.0 |

## TABLE 4

The table consists of scores of hexagon agility testin female subjects.

The 7 female subjects(7.2%) are under the category of excellent and 65 subjects(67.0%) are above average and 14 (14.4%) are under average category and 7 (7.2%) are below average and only 4 (4.1%) are under poor.

## figure 6: Graphical representation of values of HAT in females

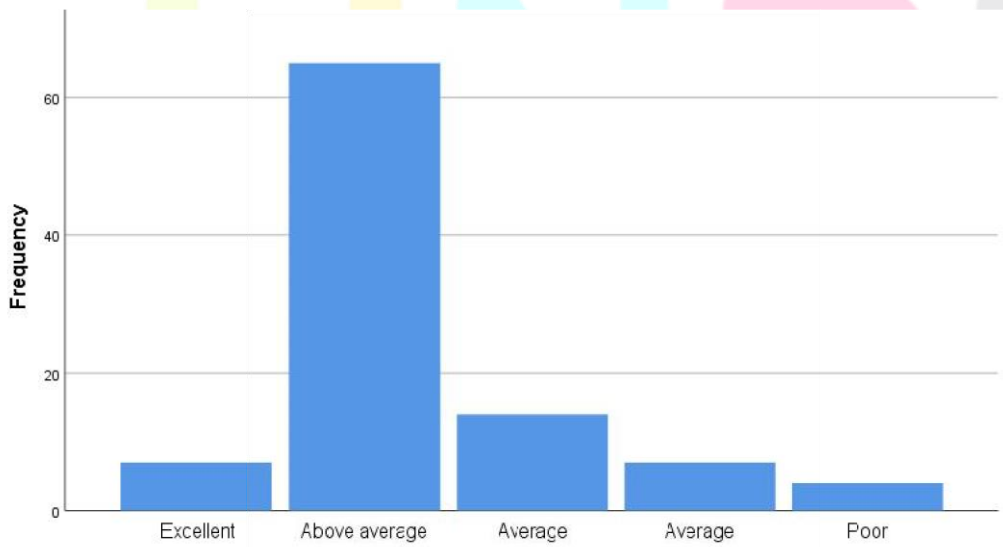


**Table 5**: Scores in FRT

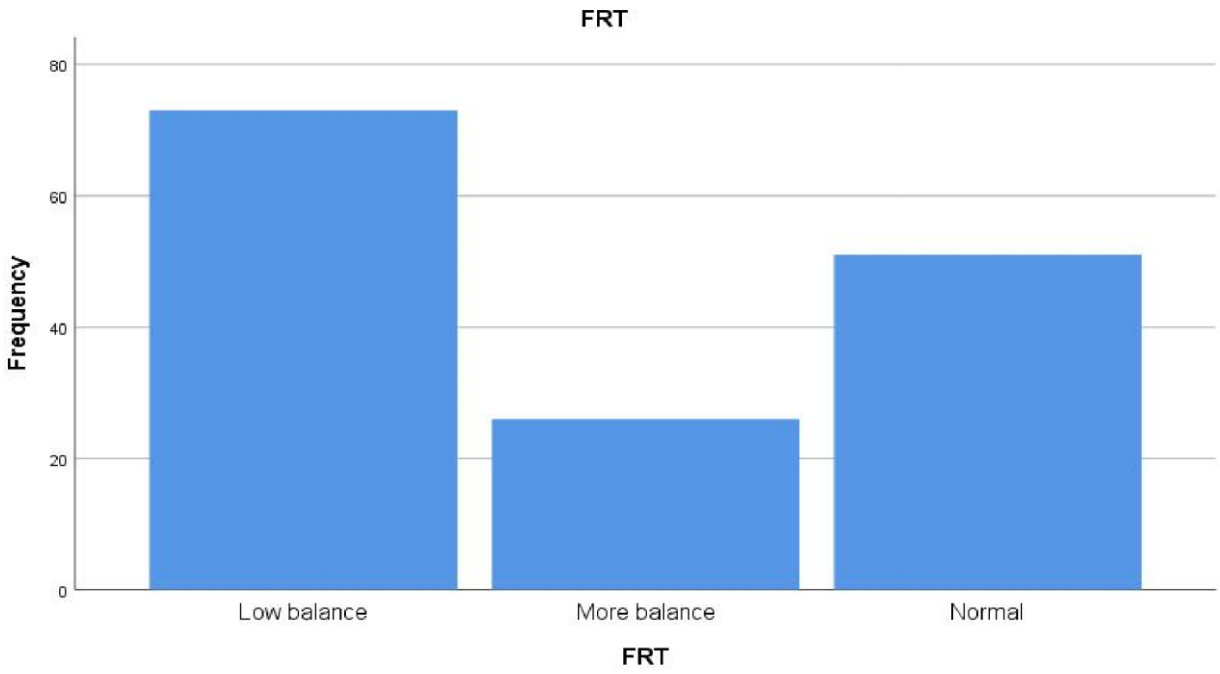
| | **Functional reach test** | |
|---|---|---|
| | Frequency | Percent |
| Low balance | 73 | 48.7 |
| More balance | 26 | 17.3 |
| Normal | 51 | 34.0 |
| Total | 150 | 100.0 |

## Table 5

The table consists of scores of functional reach test(FRT).

There are 73 subjects (48.7%) under low balance category and 26 (17.3%) have more balance and 51 (34.0%) are under normal balance.

**Figure 7**: Graphical representation of values of FRT



# RESULTS

As per the data collected, out of 150 subjects 53 are males and 97 are females.

Among males 13 subjects are under the category of excellent with 24.5% of total and 19 subjects are above average with 35.8% and 15 are under average category with 28.3% and 6 are below average with 11.3% in hexagon agility test.

Among females, 7 subjects are under the category of excellent with 7.2% of total and 65 subjects are above average with 67.0% and 14 are under average category with 14.4% and 7 are below average with 7.2% and only 4 are under poor with 4.1% in hexagon agility test.

73 subjects are under low balance category with 48.7% and 26 have more balance with 17.3% and 51 are under normal balance with 34.0% in functional reach test.

## DISCUSSION

In this study which aims to observe the effect of balance and agility in recreational badminton players. It was determined that, out of 150 subjects 53 are males and 97 are females with age group of 18-25 years.

The results in table 2 shows that, among males, majority of them falls under the category of above average with 35.8% and the results in table 3 shows that among females 67.0% are under above average category for hexagon agility test.

Sopa Ioan Sabin et al.,(2017) conducted a study that agility is necessary for volleyball players for their passing and spiking. They have undergone pre and post testing of agility which showed that the subjects are in good and excellent category[8].

Saraswat et al., (2015), found that 4 weeks of balance training significantly improved agility ($p<0.05$). In their study the effects of 6-week dynamic balance studies on agility and vertical jump in football players, Güler and Eniseler (2017), found that 6-week balance exercises significantly improve agility and explosive strength ($p=0.005$).[36]

Agility movements involves perceptual components like decision making and anticipation in all processes in sport games. Speed and agility involve moving the body very quickly, as fast as possible, but in agility skill we add the attribute of changing direction that is very important in sport games.[8]

The results in table 4 shows, majority of the (48.7%)subjects are under low balance category in functional reach test.

Sopa Ioan Sabin et.al.,(2017) conducted a study on testing balance in volleyball player concluded that the subjects are in good category after pre and post testing of balance[8].

Balance is the base of all movements. There is a constant loss and recovery of balance during movement. Although balance is generally thought of as a static process, it is a highly integrated dynamic process that involves many neurological ways. In order to maintain body position during an action, acceleration and deceleration, during sudden location and direction changes, there is a need for balance.

# CONCLUSION

This study concluded that balance in recreational badminton players is low (48.7%) by functional reach test, which shows increased risk for falls during the play. To avoid this, the subjects have to improve their balance by adding exercises including balance in their daily routine activity.

In hexagon agility test, both males(35.8%) and females(67.0%) are having above average agility. This shows the subjects are having good agility.

LIMITATIONS

1. Both males and females are included.
2. 2.sample size is less

RECOMMENDTIONS

1. Various other fields tests can be used for balance.

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