

Original Research Article

## Association between Agility and VO<sub>2</sub> max in Badminton and Tennis Players

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### ABSTRACT

The purpose of this study was to find correlation between agility and VO<sub>2</sub> max in tennis and badminton players.

**Methodology:** In this study sample of 37 male Badminton and 37 male Tennis players were taken with the age group of 18-25 yrs. Both the Tennis and badminton players were subjected to T- Test to measure agility and Queen's college step test to measure VO<sub>2</sub>max, to find which game players had greater agility and VO<sub>2</sub>max and to find the correlation between agility and VO<sub>2</sub> max.

**Result:** The mean VO<sub>2</sub>max in Badminton players was 50.20 ml/min/kg and in Tennis players the mean was 50.69ml/min/kg, the mean agility time in Badminton players was 13.03 seconds and in Tennis players was 13.79 seconds and there was a negative correlation between agility and VO<sub>2</sub>max of Badminton and Tennis players.

**Conclusion:** The study concludes that there was no difference in agility between tennis and Badminton players, also there was no difference in VO<sub>2</sub>max between tennis and Badminton players and the VO<sub>2</sub>max is indirectly proportional to agility in both Badminton and Lawn Tennis players.

**Key words:** Agility, VO<sub>2</sub>max, T-Test, Queen's college step test, Tennis and Badminton players.

### INTRODUCTION

Racket sports have two to four opposing players with rackets; they rally a ball or shuttle cock on a defined playing surface and can be played with a net dividing the players. The four main racket sports are Badminton, Tennis, Lawn Tennis and Squash. The physical and physiological demands in racket sports vary to a large extent and are influenced by a multitude of factors, such as the style of the player, the gender, the level and style of the opponent, the surface, the equipment (i.e. missile and racket characteristics) and the environmental factors (i.e. temperature and humidity) (Fernandez Fernandez et al., 2006).<sup>[1]</sup>

The duration of competition in Badminton varies between 30-60 minutes to

more than five hours in Tennis. Badminton players need excellent court speed and agility with a good background of endurance to be successful in the game.<sup>[2]</sup> Running speed and agility are important to the badminton players due to the need for speed variation, height and approach to the shuttle.<sup>[2]</sup> Badminton players cover a lot of ground during a match with little rest. Not only is aerobic fitness important for court play, but you need to be fit for long technical training sessions and to recover well between games during extended tournament play.<sup>[3]</sup> Leach (1988) stated that tennis depends upon quick bursts of speed interspersed with slower gliding steps. In other words, to strike the ball effectively in tennis, the body must be properly positioned, which requires the use of legs

and feet. Agility is crucial to good court movements and correct positioning on the court. [4]

Agility is a rapid whole-body movement with change of velocity or direction in response to a stimulus. Agility has physical relationships with physical qualities such as strength, power and technique, as well as cognitive components such as visual scanning techniques, visual scanning speed and anticipation. [5] An athlete must be able to accelerate, decelerate and change directions rapidly with good body control in order to perform well and reduce their risk of injury. Enhanced agility may also help improve performance and even assist in the prevention of some types of injuries, especially falls. [6]

VO<sub>2</sub> max is defined as the highest rate of oxygen consumption attainable during maximal or exhaustive exercise. VO<sub>2</sub> max helps in performing moderate to high intensity exercises for prolonged period of time. [7,8] The most important determinant of athletes' cardiorespiratory fitness is being considered as VO<sub>2</sub> max. [9] There are several step tests which can be used to calculate VO<sub>2</sub>max. Queen's College step test or QCT is the simplest one and has already been established as the best indirect method to evaluate cardio respiratory fitness in young Indian individuals. [10]

The purpose of this study was to find association between VO<sub>2</sub>max and agility amongst Badminton and Lawn Tennis players and also, to find out difference in VO<sub>2</sub>max and agility among Lawn tennis and badminton players.

## METHODOLOGY

- **Study Design:** It is a cross-sectional survey study.
- **Study Setting:** Goregaon Sports Club, Andheri Sports Complex, Father Agnel's Sports Ground.
- **Sample size:** 74 players (37 badminton and 37 Tennis players)
- **Inclusion criteria:**

- Male Badminton and Tennis players of the age group 18-25 years.
- Players with playing experience of minimum 3 years with regular practice.

➤ **Exclusion criteria:**

- Players less than 18 years of age and more than 26 years.
- Players who have an experience of less than 3 years.
- Players who do not practice regularly.
- Players having any musculoskeletal, cardiopulmonary or neurological impairment that would interfere with the results of the examination.

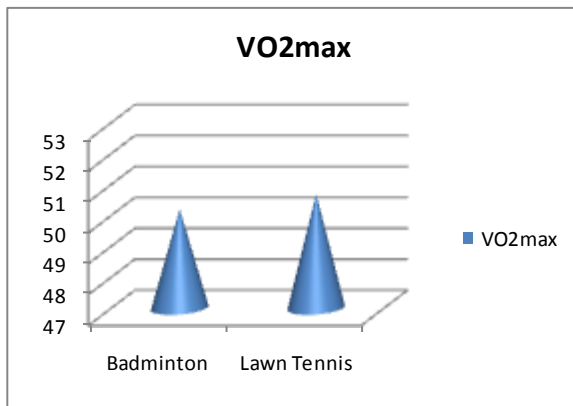
➤ **Ethical Approval:** The study was approved by Institutional Ethics and Research committee of D.Y. Patil University. Written informed consent form was taken from all players and their identification information was kept confidential.

➤ **Procedure:**

37 Tennis and 37 Badminton players were selected after inclusion and exclusion criteria. The players were made aware about the purpose of the study. Players were given instructions about performing the T-test for agility. Marking cones, measuring tape and stopwatch were used for the same. Players were given a break for 5-10 minutes and then they were made to perform Queen's college step test for 3 minutes at the rate of 24 steps/minute for the calculation of VO<sub>2</sub>max. The recovery pulse rate was determined for a 15-second period starting 5 seconds into recovery and the maximum oxygen uptake was calculated. [11]

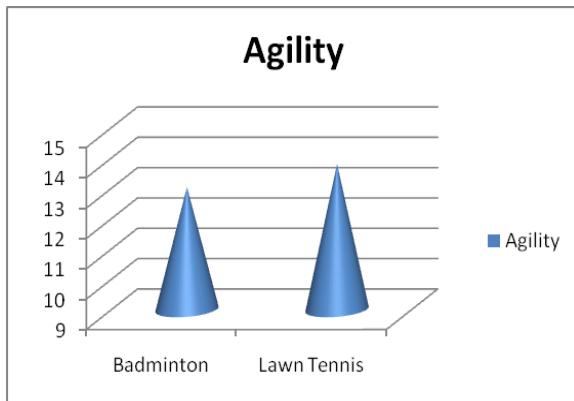
**Scoring:** An estimation of VO<sub>2</sub> max was calculated using the formula VO<sub>2</sub>max (ml/kg/min) = 111.33 - (0.42 x pulse rate beats/min). The data obtained was statistically analysed. [12]

## RESULT



Graph: 1: VO2max between Badminton and Tennis Players

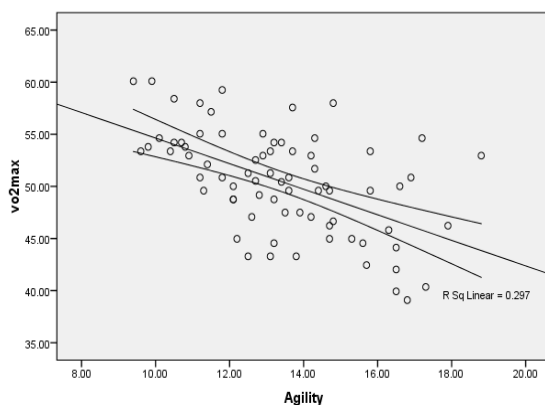
**Inference:** The above Graph shows in Badminton players the mean VO<sub>2</sub>max was 50.20 ml/min/kg and in Tennis players the mean VO<sub>2</sub>max was 50.69ml/min/kg



Graph: 2 Agility between Badminton and Tennis Players

**Inference:** The above graph shows in Badminton players, the mean time taken for agility was 13.03 seconds and in Tennis players the mean time taken for agility was 13.79 seconds.

Scatter diagram Showing correlation Between VO<sub>2</sub>max and Agility



Graph: 3: Correlation between Agility and VO<sub>2</sub>max in Badminton and Tennis Players

**Inference:** The above graph shows Karl Pearson's correlation coefficient (r) to determine the association between the two variables (VO<sub>2</sub>max and agility). There was a negative correlation present between agility and VO<sub>2</sub>max of Badminton and Lawn Tennis players.

## DISCUSSION

The study was done on 74 male players (37 Badminton players and 37 Lawn Tennis players) of age group 18-26 years. The objectives of the study were (a) To compare VO<sub>2</sub> max between Tennis and Badminton players (b) To compare Agility between Tennis and Badminton players. (c) To assess correlation between Agility and VO<sub>2</sub>max in Tennis and Badminton players.

(a) To compare VO<sub>2</sub> max between Tennis and Badminton players: For Badminton players, the mean VO<sub>2</sub>max was 50.20 ml/min/kg with standard deviation of 4.42 ml/min/kg whereas for Tennis players the mean VO<sub>2</sub>max was 50.69 ml/min/kg with standard deviation of 5.4 ml/min/kg. The mean VO<sub>2</sub>max can be rated as excellent in both Badminton as well as Tennis players.

[13] The size of court for both the sports is different, the researchers wanted to compare the difference in the mean VO<sub>2</sub>max between Badminton and Tennis players, the statistical analysis reveals that there was no significant difference in VO<sub>2</sub>max between the two games.

(b) To compare Agility between Tennis and Badminton players: For Badminton players, the mean agility was 13.03 seconds with standard deviation of 2.17 seconds whereas for Tennis players the mean agility was 13.79 seconds with standard deviation of 2.17 seconds. However, the P value was greater than 0.05 stating that the difference was insignificant. Agility requirements in a court-based sport are very different to those of a field-based team sport. In Badminton, because of the very small court, involving a high frequency of diagonal, lateral, forward and backward movements, good agility is very essential. In Tennis, players need to respond to different sorts of shots and move

quickly while constantly changing direction. Hence it is very important for players of both the sports to have good agility as it is one of the primary determining factors for success.

(c) To assess the correlation between agility and VO<sub>2</sub>max in Tennis and Badminton players: According to this study the results of Pearson test, reveals that there was a negative correlation between agility and VO<sub>2</sub>max which suggested that VO<sub>2</sub>max is indirectly proportional to agility. As the VO<sub>2</sub>max of the player increases, the time taken by the player to complete the agility test reduces. The finding of this study is supported by studies done by YUSUF KÖKLÜ et al.2010, [14] Thomas et al, 2010, [15] Sporis et al, 2008 [16] and Barun et al 2014. [17]

## CONCLUSION

This study concludes that there was no significant difference in agility between Badminton and Tennis players; there is no significant difference in VO<sub>2</sub>max between Badminton and Tennis players. This study also concludes VO<sub>2</sub>max is indirectly proportional to agility in both Badminton and Tennis.

Conflict of Interest: Nil

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