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<https://ejournal.upi.edu/index.php/penjas/article/view/23751>DOI: <https://doi.org/10.17509/jpjo.v5i1.23751>**The Application of Collant Racket Tennis Technology to Measure Service Skills: A Pilot Study on Junior Tennis Athletes****Rina Ambar Dewanti\*, Beltasar Tarigan, Dian Budiana, Yudy Hendrayana, Lutfi Nur**

Sekolah Pasca Sarjana, Universitas Pendidikan Indonesia

**Article Info***Article History :**Received December 2019**Revised December 2019**Accepted February 2020**Available online April 2020**Keywords :**Collant racket tennis, Service, Tennis***Abstrak**

Penelitian ini bertujuan untuk mengetahui keterampilan servis pada atlet Junior Tennis Lapangan. Penelitian ini merupakan penelitian deskriptif dengan melibatkan 30 atlet junior (19 laki-laki dan 11 perempuan). Pada penelitian ini, keterampilan servis diukur dengan menggunakan alat Collang Smart Tennis Racket Sensor Tracker Motion Analyzer untuk mengetahui kecepatan bola hasil pukulan. Data hasil pukulan servis langsung terhubung dengan aplikasi pada smartphone yang kemudian dianalisis dengan menggunakan teknik statistik deskriptif. Hasil penelitian menunjukkan bahwa rata-rata hasil kecepatan pukulan servis atlet junior berada pada kategori cukup. Diperlukan model latihan servis yang tepat agar dapat meningkatkan kecepatan hasil pukulan servis.

**Abstract**

*This study was aimed at determining the service skills of Junior Field Tennis athletes. This research is a descriptive study involving 30 junior athletes (19 males and 11 females). In this study, the service skills were measured by using the Collang Smart Tennis Racket Sensor Tracker Motion Analyzer to determine the speed of the ball. The data of the services conducted were directly connected to the application on the smartphone, which were then analysed by using descriptive statistical techniques. The results showed that the average speed of junior athletes' services was in the moderate category. An appropriate service training model is needed to increase the speed of service.*

## INTRODUCTION

In the field of tennis, there are several age categories that are contested including the early age category, which is under the age of 10 years, the children's category is 11-12 years, the beginner category is 13-14 years and so on (Kramer, Huijgen, Elferink-Gemser, & Visscher, 2017). Regarding performance sports, an athlete's performance is a condition that must be considered by the coach. To achieve the performance, an athlete must have good and adequate physical abilities, technical, psychological, and strategy in dealing with a competition in a match (Prasetiono & Gandasari, 2018). Therefore, it is natural that a coach must be able to know the athlete's initial abilities in order to optimize the type of training that will be provided later (Vickery et al., 2014).

In the game of tennis, there are some basic techniques that need to be mastered, including basic techniques which include serve, forehand-backhand groundstrokes, smashes, and other types of shots (Sukadiyanto, 2005). Research on service strikes has been widely carried out, such as Kardiawan, Satyawan, & Ariawan (2018) which examines the development of digital sensor-based tennis ball strength measuring devices, other studies examine the effect of biofeedback given on accuracy in service punches (Galloway, 2011).

Research on the comparison of men and women in field tennis has been widely carried out including marketing differences conducted on professional tennis players by sex (Wozniak, 2012), online media comparisons and traditional newspaper coverage of US Open tennis tournaments for men and women (Kian & Clavio, 2011). Furthermore, in sports performance Munivrana, Filipčić, & Filipčić (2015) examine the speed, agility, neuromuscular strength, and selected anthropometric variables and the performance results of 154 male and 152 female junior tennis players with the result that male tennis players perform significantly better than women in all motor test items, but in terms of body mass index there is no significant difference.

A teacher or a coach must be able to see the talents and abilities of students and athletes who can never be measured directly but they must be concluded from the training process, appearance during the game that varies from time to time (Hanief, Puspodari, & Sugito, 2017).

It is necessary for an athlete to have continuous training programs to reach their high performance when they participate in a match so that the target can be achieved at the end of the training. Therefore, the initial identification of an athlete's basic technical ability profile must be made by a coach.

In this millennial era, there is certainly an easiness in helping coaches in analyzing the abilities of their athletes which is better known as sports science technology. A coach is required to be able to carry out his profession, equip himself with a set of important supporting competencies including applying various instruments that can be used to predict one's achievements so that the coach's performance becomes more effective in identifying, selecting talented athletes, and assessing the athlete's initial profile, and evaluating the results of the practice. The application of sport science has some uses including (1) to obtain accurate data about the athlete's basic abilities; (2) to help create specific training programs; according to the level of an athlete; (3) to monitor and evaluate the performance carried out; and (4) to improve an athlete's abilities. It is in accordance with the research of Reade, Rodgers, & Spriggs (2008) which reveals that sport science can contribute to sports coaching and increase motivation in applying new ideas in making sports programs.

Based on this background, the researchers are interested in examining the service skills of junior male and female athletes by using the Collang Smart Tennis Racket Sensor Tracker Motion Analyzer to determine the speed of service results of each athlete. The purpose of this study is to determine differences in service skills in male and female junior athletes.

## METHODS

The method applied in this study is a descriptive method with the aim to provide an overview of the service capabilities of 30 junior tennis athletes (19 men, 11 women) with the age range from 14-16 years old. The instrument used in this study is the Collang Smart Tennis Racket Sensor Tracker Motion Analyzer (Leung, 2017) which is set on the bottom handle of the racket and integrated with a smartphone that is used to find out various types of activities such as the speed of the ball, the number of times the ball touches the racket and so

on, as seen in Figure 1. Each athlete serves five times using a racket that has been installed by Collang Smart Tennis Racket Sensor Tracker Motion Analyzer. In this study, only data on service speed that will be used in the data collection, then the data is analyzed with descriptive statistical techniques with categorization using norm reference or PAN (Malik & Rubiana, 2019).



**Figure 1.** Collang Smart Tennis Racket Sensor Tracker Motion Analyzer

## RESULT AND DISCUSSION

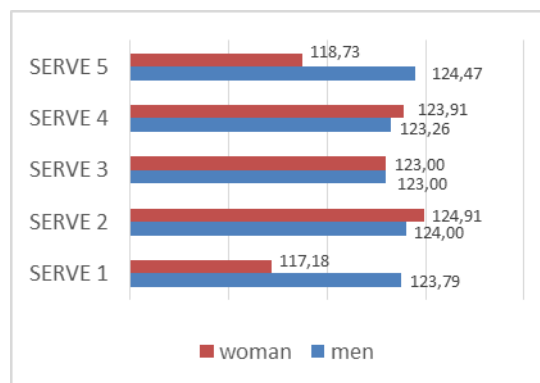
The purpose of this study is to determine the differences in service skills in male and female junior athletes. The data from the research conducted illustrates the service abilities of junior tennis field athletes. The descriptive summary of the overall research data is as follows:

**Table 1.** Summary of Service Result Descriptions

	Total	Average	Min	Max	SD
Service 1	3641	121.37	90	156	18.35
Service 2	3730	124.33	89	198	23.01
Service 3	3690	123.00	95	185	21.86
Service 4	3705	123.50	91	184	21.51
Service 5	3671	122.37	94	160	17.72
Best Serve	3734	124.47	95	160	17.99

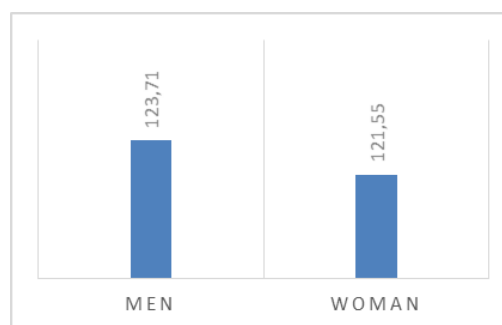
Based on table 1, it can be seen that overall result of the first service gets a total score of 3641 with a mean of 121.73 and a standard deviation of 18.35. On the second service, the result gets a total score of 3730 with an average of 124.33 and a standard deviation of 23.01. The result of the third service gets a total score of 3690 with a mean of 123 and a standard deviation of

21.86. The result of the fourth service gets a total score of 3705 with an average of 123.50 and a standard deviation of 21.51. The fifth service gets a total score of 3671 with an average of 122.37 and a standard deviation of 17.72. The total score result on the best serve or the best service from five trials gets a total score of 3734 with an average of 124.47 and a standard deviation of 17.99. The detailed average of the service results by sex can be seen in Figure 2.



**Figure 2.** Average Results of Services by Sex

Figure 2 shows the average service result by sex. The highest average speed of the smash in male athletes occurs in the 5th service with a mean of 124.47 while the lowest smash is in the third service with a mean of 123.00. In female athletes, the highest average service occurs in the second service with a mean score of 124.91 while the lowest in the first service with a score of 117.18. The difference in the average best smash of male and female athletes is shown in Figure 3.



**Figure 3.** The Difference in the Average of Best

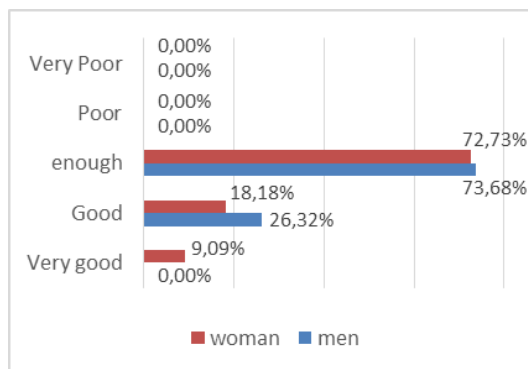
Figure 3 shows the difference of the best service results average for male and female athletes. From

these results, it can be seen that male athletes get higher score for the best service average with a score of 123.71 compared to female athletes who get 121.55 results with a difference of 2.16 points. Next, table 2 shows a descriptive summary of the results of the service for male and female athletes.

**Table 2.** Summary of the Results of the Service

	Male	Female
Excellent	0	1
Good	5	2
Sufficient	14	8
Poor	0	0
Very poor	0	0
<b>Total</b>	<b>19</b>	<b>11</b>

Table 2 shows the categories of male and female athletes' service based on norm references (PAN). Based on these data, it is seen that the average male athletes are in the sufficient category of 14 athletes and 5 athletes are in the good category, while the average female athletes are in the adequate category with a total of 8 athletes, 2 athletes in the good category and 1 athlete gets an excellent category. The percentage of the service achievements in detail can be seen in Figure 4.



**Figure 4.** The Percentage of Junior Tennis Athletes'

Figure 4 shows the results of the percentage of junior tennis athletes' service achievements by sex. The highest percentage in the category is quite good in male athletes with 73.68% achievement and in female athletes with 72.73% achievement. In the good category, male athletes get a percentage of achievements of 26.32% while female athletes get a percentage of achievements of 18.18%. Excellent percentage is only obtained by female athletes with 9.09% achievements. There is no percentage achievement in the category of

poor and very good in male or female athletes.

Service is the initial strike in starting a tennis match that is the most important to master to score points directly because it is not affected by the opponent's ball (Loman, 2008). In line with the explanation before, other research states that in the National Junior Tennis Championship, the average service success shows a fairly high percentage of 72.61% where 52.62% in the first try and 19.99% in the second try (Khusni, 2015). Furthermore, Kramer, et al., (2017) reveals that in predicting the performance of junior tennis athletes, various early profile measurements are needed in order to obtain comprehensive data on athlete's abilities.

Related to the skills of an athlete, Myer & Faigenbaim (2011) explain that when performance is to be improved, basic skills and abilities are needed which become the main foundation of a performance. Furthermore, the training program for junior athletes must be able to adjust the volume and intensity of training to create an optimal training adaptation in understanding the physical and psychosocial uniqueness of childhood and adolescence. To design a good training program, the trainer must pay attention to the various conditions of the athletes and present a pleasant training process but the essence of the practice must be fulfilled (Azeem & Al Ameer, 2010; Malik, 2013; Mavvidis, Ntinopoulos, Dallas, & Mavvidis, 2015). In addition, training programs combined with the application of sport science technology are highly recommended to motivate athletes so that athletes do not feel burdened or bored in carrying out the training process (Bice, Ball, & Mcclaran, 2015; Nur, Setiadi, Kusdinar, & Malik, 2019; Reade et al., 2008).

## CONCLUSION

The initial ability of service for male and female junior athletes is in the sufficient category by applying a norm reference benchmark (PAN). Thus, the coach must be able to develop and implement appropriate training strategies in an effort to increase the speed of the junior athlete's service strike. For further research, the findings in this study are expected to be used as a reference in applying sport science in a study, but it does not rule out the possibility of further research to be

able to apply sport science in the research related to sports in particular.

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