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# Description of the morpho- functional characteristics of junior tennis players

Jorge Mauricio Celis

ABSTRACT

The description of the morpho-functional characteristics of junior tennis players through basic and easy to access protocols that evaluate relevant aspects for performance in tennis, help the development and evolution of physical preparation and sport training.

**Key words:** Imagined practice, visualization, sensations, exercises
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**Corresponding author:** Jorge Mauricio Celis
Email: maito419@gmail.com

## INTRODUCTION

Tennis players' sporting performance depends on their morphofunctional qualities; therefore, it is important to quantify them in order to control and plan sport training. (Sánchez-Muñoz et al., 2007).

Tennis players usually exceed the 50th percentile in height (Myburgh et al.,2016), and their body fat percentages are lower than in sedentary persons (Kovacs, 2007). As to physical demands, in tennis there is a predominance towards explosive movements such as accelerations, decelerations, and changes of direction (Fernandez-Fernandez et al., 2015; 2016; Berdejo & González, 2009; Kovacs, 2007). During a point, a tennis player typically runs between 8 - 15m, and changes of direction are very common (Fernandez-Fernandez et al., 2009). Thus, it is very useful to evaluate and train explosive strength, short distance speed, agility and RSA (Repeated Sprint Ability).

The structural characteristics of competition in young tennis players have also been studied (Torres-Luque et al., 2011); however, in junior tennis we cannot neglect aspects such as long term training, avoiding early specialization and excess training (Balyi & Williams, 2009). Thus, factors like predicting adult height and assessing the age of peak growth rate are great support tools.

A very trendy subject over the last years is the capacity to assess the maturation of young people, and one of these is at the somatic level using growth curves, i.e. the age of peak speed growth rate proposed by (Mirwald et al., 2002) which is used by Balyi and Williams (2009 in their proposal to plan training in different sports, including tennis. However, this method has been discussed over the last few years and it is mainly recommended in boys between 12-15 years old and girls between 10-13 years old as these are the ages when the growth jump occurs (Malina & Koziel, 2014).

This paper intends to describe the morpho-functional characteristics, the prediction of the adult height and the age of peak growth rate in a sample of juniors Colombian tennis players.

## METHODOLOGY

### Participants

76 Colombian tennis players, females (n=38) and males (n=38), out of which all players between 10 and 16 years old, who are in the national ranking of this country.

### Procedure

After getting informed consent, parents or guardians authorized the use of the data for this investigation. Data were gathered in a set format: date of birth, height of the parents (verbal communication) and anthropometric measurements considering the recommendations of the International Society for the Advancement Kinanthropometrics.

We evaluated tests of: horizontal jump, 5m sprint, 10m sprint, agility 10x5mts, spider test and Repeat Sprint Ability 10x20mts with a 20 second rest between each repetition. The evaluation was made by a trained team that included sport and physiotherapy professionals.

Finally, protocols were developed: for body fat percentage at young ages (Slaughler, 1988), for prediction of adult height (PAH) (Kamis & Roche, 1994) and, for the age peak growth velocity (PGV) (Mirwald et al., 2002).

## Statistical analysis

The descriptive analysis included average and standard deviation using SPSS programme version 24.

## FINDINGS AND DISCUSSION

Tables 1 and 2 show the descriptive statistics for males and females per age groups. The morphologic characteristics increase in size, in weight, and height as age naturally increases, also, the girls, have more fat mass, with the exception of the 10-11 age group, since boys at these ages are normally heavier and have more fat mass than girls. In this age group there are only 4 boys and 9 girls, and just one single boy in low form modifies the averages of the results.

| Variable | Unit | 8 years (n=3) X̄ ± SD | 10/11 years (n=9) X̄ ± SD | 12/13 years (n=12) X̄ ± SD | 14/15 years (n=12) X̄ ± SD | 16 years (n=2) X̄ ± SD |
|---|---|---|---|---|---|---|
| Chronological age | Year | 8.5±0.42 | 10.8±0.51 | 13.0±0.46 | 14.8±0.46 | 16.4±0.14 |
| Height | Cm | 130.8±6.23 | 141.9±5.59 | 158.1±6.40 | 168.4±5.71 | 168.0±1.76 |
| Weight | Kg | 27.8±3.67 | 36.5±7.66 | 45.3±5.57 | 49.2±6.97 | 68.3±2.40 |
| Sum Pl 3 | mm | 21.0±1.0 | 32.0±10.9 | 27.6±7.92 | 25.1±7.49 | 34.0±4.24 |
| Sum Pl 7 | mm | 47.6±4.51 | 75.6±25.5 | 67.5±21.0 | 58.2±15.9 | 76.0±15.5 |
| % fat | % | 12.2±1.12 | 18.3±6.33 | 16.0±4.98 | 14.2±4.36 | 16.8±0.51 |
| K&R | Cm | 179.0±8.7 | 179.2±7.05 | 178.8±6.49 | 177.2±5.30 | 169.6±0.04 |
| PGV age | Year | - | 13.7±0.23 | 14.4±0.56 | 14.7±0.49 | - |
| Horizontal jump | Cm | 139±25 | 144.6±16 | 173.2±18 | 199.1±15 | 211±15 |
| 5mts | Sec. | 1.97±0.28 | 1.80±0.30 | 1.64±0.26 | 1.54±0.23 | 1.49±0.08 |
| 10mts | Sec. | 2.99±0.21 | 2.82±0.31 | 2.68±0.18 | 2.37±0.22 | 2.20±0.14 |
| Agility | Sec. | 20.56±2.11 | 21.83±1.07 | 20.26±0.98 | 18.88±0.77 | 19.40±1.26 |
| Agility Spider W | Sec. | 21.53±1.27 | 22.31±1.22 | 19.40±1.33 | 18.05±0.67 | 18.36±1.07 |
| RSA 10X20 P | Sec. | - | - | 3.78±0.21 | 3.51±0.27 | 3.55±0.00 |
| RSA 10x 20T | Sec. | - | - | 37.87±2.12 | 35.19±2.75 | 35.51±0.07 |

*Sum Pl= sum of skin folds. *K&R= Kamis and Roche adult height prediction, 1994.

*PGV=Peak Growth Velocity as of maturity-offset (Mirwald et al., 2002)

*RSA= Repeat Sprint Ability 10 times, 20mts, A=average T=Total of all 10 covered.

*Table 1. Descriptive statistics for males per age range (n=38).*

| Variable | Unit | 7/9 years. (n=4) X̄ ± SD | 10/11 years (n=4) X̄ ± SD | 12/13 years (n=14) X̄ ± SD | 14/15 years (n=16) X̄ ± SD |
|---|---|---|---|---|---|
| Chronological age | Year | 9.0±0.82 | 10.8±0.52 | 13.1±0.64 | 14.8±0.39 |
| Height | Cm | 131.1±7.17 | 145.5±7.17 | 157.0±6.30 | 160.7±4.78 |
| Weight | Kg | 25.8±1.13 | 31.5±4.10 | 49.1±7.86 | 55.3±7.73 |
| Sum Pl 3 | mm | 23.5±5.50 | 22.5±1.73 | 38,7,6±9,44 | 41.6±9.52 |
| Sum Pl 7 | mm | 54.5±8.34 | 61.2±2.63 | 94.7±23.18 | 104.3±25.6 |
| % fat | % | 16.2±3.46 | 13.4±0.76 | 21.0±4.24 | 22.8±3.98 |
| K&R | Cm | 164.7±7.85 | 169.0±4.12 | 163,,0±5,16 | 162.6±4.51 |
| PGV age | Year | - | 12.1±0.39 | 12.3±0.47 | - |
| Horizontal jump | Cm | 139±11 | 148±19 | 162±11 | 162±15 |
| 5mts | Sec. | 1.76±0.32 | 1.92±0.17 | 1.79±0.15 | 1.72±0.13 |
| 10mts | Sec. | 2.88±0.36 | 2.92±0.11 | 2.67±0.21 | 2.66±0.15 |
| Agility | Sec. | 23.40±1.36 | 22.49±0.57 | 20.84±1.10 | 20.56±0.85 |
| Agility Spider T | Sec. | 22.46±1.74 | 22.48±0.27 | 20.24±1.15 | 20.05±1.19 |
| RSA 10X20 P | Sec. | - | 4.21±0.31 | 3.99±0.24 | - |
| RSA 10x 20T | Sec. | - | 42,19±,3,11 | 39.99±2.41 | - |

*Sum Pl= sum of skin folds. *K&R= Kamis and Roche adult height prediction, 1994.

*PGV=Peak of Growth Velocity as of maturity-offset (Mirwald et al., 2002)

*RSA= Repeat Sprint Ability 10 times, 20mts, A=average T=Total of all 10 covered.

*Table 2. Descriptive statistics for females per age range (n=38).*

The functional characteristics of males showed better results than females, and that the differences increase with age. In the 10-11 year old age group, the results are similar in both sexes, there is even a better horizontal jump in girls than in boys.

In general, the results of morpho- functional characteristics are less representative if compared with tennis players with a junior national ranking in the US (Roetert et al., 1992) as well as ITF ranking (Sánchez-Muñoz et al., 2007). However, we should take into account the fact that few works describing morpho-functional characteristics have been made with base samples of South American players, and in this case, the sample is fromColombian junior national ranking players. PAH ranges between (169-179cm) for males and (162-169cm) for females, which are low height results for current professional tennis.

Finally, PGV varies between 13.7-14.7 years of age for males and 12.1-12.3 years of age for females.

## CONCLUSIONS

Morpho- functional characteristics in Colombian tennis players show lower results than studies made on national rankings in the US and ITF rankings. PAH for men and women is low for current professional tennis and PGV keeps normal values.

This study is a practical tool for coaches and trainers, with basic standardized protocols, of easy access and application, it also evaluates relevant aspects for tennis performance, and it contributes to talent identification, as well as long term training. Proposals for player evaluation allowing the control of junior tennis players at a morpho-functional level could be an important step for developing countries.

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