IMPROVING SPEED MOTOR SKILLS IN WOMEN'S FOOTBALL-TENNIS FOR ELITE PLAYERS

Corina ȚIFREA[1], Anamaria GHERGHEL[1*]

[1] National University of Physical Education and Sport, Faculty of Physical Education and Sport, Bucharest, Romania
*Corresponding author: anemaria.gherghel@yahoo.com

https://doi.org/10.35189/dpeskj.2021.60.1.5

Abstract. *Football-tennis is a sport that appeared in 1922, and in 1940, the first official regulation was issued. It can be an individual or team sport with single, double or triple events, plus the mixed doubles and triples, which is played by both men and women. Football-Tennis is not recognised nationally and globally as other sports, therefore, in most cases, no emphasis is placed on the physical, technical and tactical training where to take into account the regularisation of training depending on the competitive period in which athletes are at a specific time. The study was conducted on elite athletes representing the Romanian team in international competitions and having a competitive experience of 10-15 years. The motor ability tested in this paper was the speed of movement, which was measured with the help of the OptoJump device. The test applied checked the running speed over the distance of 5 meters. Two tests were performed by players as follows: an initial one, which aimed to determine the level of manifestation of their speed of movement, and a final one, which aimed to determine the level of progress following the application of the centralised training programme. The main objective was to find out: step length, flight time, contact time, flight phase, flat foot, propulsion phase, steps/m, height, angle of inclination and speed in m/s.*

Keywords: *football-tennis, speed, performance, OptoJump.*

Introduction

The emergence of international football-tennis can be placed exactly in 1922 when the partners of the Slavia Prague football club in the Czech Republic began to practise as a leisure activity a sport that they called football over the rope (the net was comus from a horizontal rope, which was replaced along the way with mesh). In 1940, the first officially written and recognised rules appeared. In the same year, the first official football-tennis competition takes place. (*History of Football-Tennis,* 2011)

Regarding the appearance of football-tennis at the national level, it can be said that it started to be practised since the 70's, but under a different name. The first competitions organised and of special importance date from 1982-1989. (Federația Română de Fotbal-Tenis [Romanian Football-Tennis Federation], n.d.)

In order to achieve a high speed, it is not enough to have only a good speed condition, but you must, among other things, have a good condition, both physically, mentally, technically and in coordination (Nikolaidis, 2014). At the same time, we must also take into account the changes that some athletes may suffer with growth, maturity, etc. (Nicolao et al., 2010).

Therefore, the development of sprinting includes not only training based on increasing speed but also training performed in order to improve endurance, technique, effort dosing such as submaximal sprints, short acceleration speeds, high pace running and especially willpower (Kraft et al., 2019).

The use of the training programme that took place between the two tests, initial test and final test, can lead to an improvement in the speed of movement, reaction, execution, improvement that can be materialised by obtaining notable results at the European Championship (Kotzamanidis et al., 2005).

Speed of movement, execution and reaction as well as explosive force are essential for maintaining optimal endurance during competitions (Manson et al., 2014).

Obviously, this requires prior training aimed at the speed of movement, reaction and execution of specific actions-football-tennis (Mirella, 2001).

Methodology

Participants

The research was carried out on a group of 10 performance athletes, aged 15-30 years, over a period of 10 months. Athletes represent the Romanian team in international competitions.

Devices

The speed assessment was performed using the OptoJump (Microgate, 2014). The data that can be measured and calculated in real time are the following:

- Contact time;
- Flight time;
- Height;
- Steps (cadence and rhythm);
- Specific power.

OptoJump is an optical measurement system that consists of a transmission and reception bar. They contain 96 LEDs (resolution of 1.0416 cm). The LEDs on the transmission bar constantly communicate with those on the reception bar. The system detects any interruption in communication between the bars and calculates their duration. Thus it is possible to measure flight and contact times during a series of jumps with an accuracy of 1/1000 second. Taking into account all these basic basic data, the dedicated software makes it possible to obtain a series of parameters related to the athlete's performance with maximum accuracy and in real time.

With the help of this measurement and evaluation device, the level of progress of the athletes will be determined by the application of an integrated training programme over ten months. The final goal of this programme was for athletes to occupy the first three places at the European Football-Tennis Championship.

Procedure

The research took place at the Romanian Olympic and Sports Complex of Izvorani over a period of 10 months (January-November 2019).

Two tests were performed, one initial to determine the stage level of travel speed and one final test to determine the level of progress.

Example of a training plan for the development of the speed specific to the Football-Tennis game, taking into acount the recommendations made by González-De Los Reyes et al. (2019):

Codes for training algorithms: S: speed development; Th: improving technical training;

Ta: improving tactical training; S.T.Th.: speed + technical training;

T.Th. + T.Ta: technical + tactical training.

Objectives - S + Technical Training:

- S.T.Th.1: sitting, jumping with rope - sprint on 20m (4x30”x20x15”p x100%/ jumps with rope with 30 seconds break followed by the sprint on 20 m with 15 seconds break, with intensity of 100% x 4 sets). Volume 70% and intensity 100%; dosage 1-3x; passive 30 second pause; work formation - in line.

- S.T.Th.2: sitting, running with knees up - sprint on 20 m (4x10x20x15”p x100%). Volume 70% and intensity 100%; dosage 1-3x; passive 30 second pause; work formation – in line.

- S.T.Th.3: sitting, jumping with the knees to the chest - sprint on 20 m (4x15x20x15”p x 100%). Volume 70% and intensity 100%; dosage 1-3x; passive 30 second pause; work formation - in line.

- S.T.Th.4: standing with your feet slightly apart at the 9 m line of the football-tennis court, running with your knees up to the 6.40 m line - back-to-back - speed running to the net and return to the 9 m line (4x10”p x 100%). Volume 70% and intensity 100%: dosage 1-2x; break 1 min passive; work formation - in line at 1 meter of net.

- S.T.Th.5: standing with his feet slightly apart at the 6.40 m line, the executor is positioned at the midline of the playing field, having on the ground 2 milestones placed to the left and right of the executor and 2 meters from it. It must move as fast as possible through the added step from one milestone to the other 30” (4x30”x30”p x 100%). Volume 70% and intensity 100%: dosage 1-3x; break 1 min passive; work formation - in line at 1 meter of net.

- S.T.Th.6: sitting, running with knees up - sprint on 20 m (4x30”x20x15”p x 100%). Volume 70% and intensity 100%; dosage 1-3x; passive 30 second pause; work formation - in line.

- S.T.Th.7: sitting, jumping with the knees to the chest - sprint on 20m (4x15reps x20x15”p x 100%). Volume 70% and intensity 100%; dosage 1-3x; passive 15 second pause; work formation - in line.

- S.T.Th.8: standing with your feet slightly apart at the 9 m line of the football-tennis court, running with your knees up to the 6.40 m line - back-to-back - speed running to the net and return to the 9 m line (4x5 reps x 1’p x 100%). Volume 70% and intensity 100%: dosage 1-2x; break 1 min passive; work formation - in line at 1 meter of net.

- S.T.Th.9: standing with his feet slightly apart at the 6.40 m line, the executor is positioned at the midline of the playing field, having on the ground 2 milestones placed to the left and right of the executor and 2 meters from it. It must move as fast as possible through the added step from one milestone to the other 30” (4x 20attack x 1’p x 100%). Volume 70% and intensity 100%: dosage 1-3x; break 1 min passive; work formation - in line at 1 meter of net.

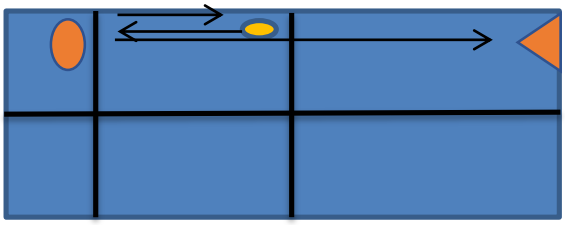

Figure 1. S.T.Th.9

- S.T.Th.10: footwork, individually - left and right picks with top attack along the line (4x20attackx1'p x 100%). Volume 70% and intensity 100%: dosage 1-3x; break 1 min passive.

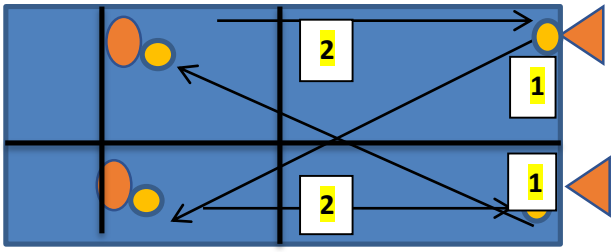

Figure 2. S.T.Th.10

- S.T.Th.11: the same, in pairs, two at a time
- S.T.Th.12: footwork, individually - left and right takeovers with top attack on the long/ short diagonal (4x20attackx1'p x 100%). Volume 70% and intensity 100%: dosage 1-3x; break 1 min passive.

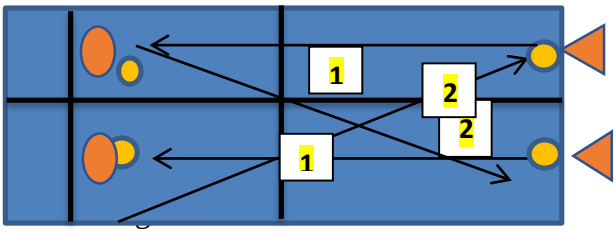

Figure 3. S.T.Th.12

- S.T.Th.13: the same, in pairs, two at a time
- S.T.Th.14: Double game with long/short diagonal attack (2x3 sets)

Objectives - S + Technical/Tactical Training (taking into accout the recommendations made by Impellizzeri et al., 2008):

- S.T.T.1 (speed + tactical training): sitting, jumping with rope - sprint on 20m (4x30"x20 x15"p x 100%). Volume 70% and intensity 100%; dosage 1-3x; passive 30 second pause; work formation - in line.

- S.T.Th.2: sitting, vertical jumps front/back in both legs - sprint on 20 m (4x10x20x15”p x 100%). Volume 70% and intensity 100%; dosage 1-3x; passive 30 second pause; work formation - in line.

- S.T.Th.3: sitting, speed running between milestones - sprint on 20m (4x6x20x15”p x 100%). Volume 70% and intensity 100%; dosage 1-3x; passive 30 second pause; work formation - line in a row (Debaere et al., 2013).

- S.T.Th.4: standing with your feet slightly apart at the 9 m line of the football-tennis court, running with your knees up to the 6.40 m line - sprint back - speed running to the net and return to the 9 m line (4x10"p x 100%). Volume 70% and intensity 100%: dosage 1-3x; break 1 min passive; work formation - in line at 1 meter of net.

- S.T.Th.5: standing with his feet slightly apart at the 6.40 m line, the executor is positioned at the midline of the playing field, having on the ground 2 milestones placed to the left and right of the executor and 2 meters from it. He must move as fast as possible by adding step from one milestone to another - sprint on 5 m - long line attack (4x30”x5mx10x30”p x 100%). Volume 70% and intensity 100%: dosage 1-3x; break 1 min passive; work formation – in line at 1 meter of net (Mujika et al., 2009).

- S.T.Th.6: in pairs of two, at 2 m from the net, the performer at the midline of the field of play - move to the left - jump over the obstacle - pass from the partner - long line attack. (4x20x30"p x 100%). Volume 70% and intensity 100%: dosage 1-3x; break 1 min passive; working formation - 2 columns, one behind the other.

- S.T.Th.7: in pairs, at 2 m from the net, the player at the midline of the field of play - moving to the right - jumping over the obstacle - passing from the partner - long line attack. (4x30x30"p x 100%). Volume 70% and intensity 100%: dosage 1-3x; break 1 min passive; working formation - 2 columns, one behind the other (Helgerud et al., 2011).

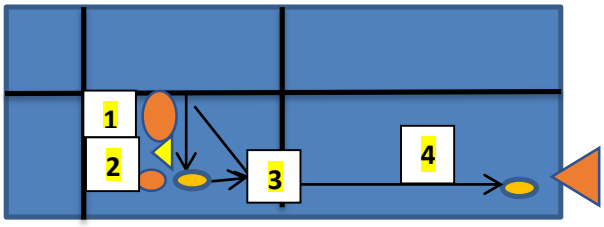

Figure 4. S.T.Th.7

- S.T.Th.8: in pairs, two at a time, takeovers from left and right with top attack along the line (4x20x30”p x 100%). Volume 70% and intensity 100%: dosage 1-3x; break 1 min passive.

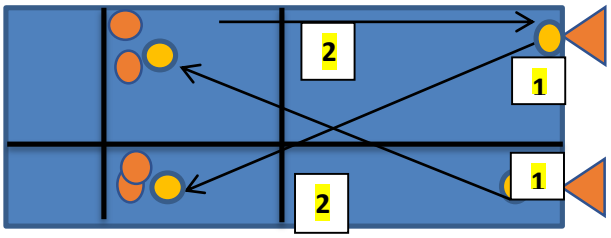

Figure 5. S.T.Th.8

- S.T.Th.9: in pairs of three - taking over from the service - passing - attack from above on a long/short or long line diagonal (4x20x30"p x 100%). Volume 70% and intensity 100%: dosage 1-3x; break 1 min passive.

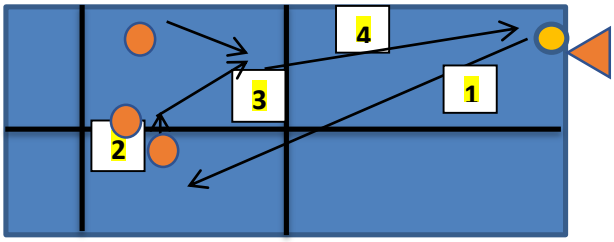

Figure 6. S.T.Th.9

- S.T.Th.10: Triple game with long left or right line attack (2x3 sets).

Results

Table 1. *Initial Testing 5 meters Speed Running*

Initial	**Step Length (cm)**	**Stride Length (cm)**	**Flight Time**	**Contact Time**	**Contact Phase**	**Foot Flat**	**Propulsive Phase**	**Pace (p/m)**	**Height**	**Stride Angle**	**Speed (m/s)**
Pic.	left	right	left	left	left	left	left	right	left	left	left
G.A	27.9%	58.8%	38.8%	61.2%	7.8%	65.2%	27.0%	6.5%	13.3%	14.2%	30.8%
R.A.	15.7%	64.8%	3.7%	13.1%	0.0%	27.9%	33.3%	6.6%	7.1%	9.2%	22.3%
C.F	0.0%	55.7%	27.4%	72.6%	20.7%	20.5%	58.9%	14.1%	0.0%	0.0%	0.0%
S.M	11.9%	66.1%	12.9%	20.1%	108.3%	52.0%	39.8%	8.6%	20.0%	15.4%	23.5%
L.M	26.8%	56.9%	36.5%	63.5%	19.2%	48.2%	32.7%	22.2%	120.0%	116.2%	1.8%
N.A	0.0%	66.6%	0.0%	3.9%	33.3%	32.5%	1.0%	7.0%	0.0%	0.0%	0.0%
P.P	21.5%	68.4%	22.5%	77.5%	8.9%	71.9%	19.2%	1.8%	75.0%	40.0%	23.9%
R.A.	19.1%	69.8%	23.3%	70.8%	14.5%	19.6%	51.4%	1.9%	20.0%	1.8%	21.5%
BB	14.0%	65.6%	19.9%	71.4%	6.9%	72.7%	16.5%	2.8%	0.0%	17.8%	10.5%
DB	20.9%	62.6%	28.9%	6.5%	33.3%	0.0%	0.0%	6.5%	50.0%	34.1%	15.2%

Table 2. *Final Testing 5 meters Speed Running*

Final	**Step Length (cm)**	**Stride Length (cm)**	**Flight Time**	**Contact Time**	**Contact Phase**	**Foot Flat**	**Propulsive Phase**	**Pace (p/m)**	**Height**	**Stride Angle**	**Speed (m/s)**
Pic.	left	right	left	left	left	left	left	right	left	left	left
G.A	31.7%	62.3%	44.4%	18.2%	50.0%	34.4%	18.8%	5.4%	84.6%	56.1%	26.9%
R.A.	16.8%	62.5%	14.1%	12.0%	125.0%	90.9%	104.5%	3.1%	33.3%	11.3%	20.4%
C.F	24.2%	59.6%	17.5%	82.5%	13.1%	40.1%	46.8%	5.0%	50.0%	48.6%	18.5%
S.M	11.9%	66.1%	12.9%	20.1%	108.3%	52.0%	39.8%	8.6%	20.0%	15.4%	23.5%
L.M	27.5%	60.0%	41.2%	65.1%	20.0%	49.2%	35.6%	28.6%	140.0%	120.0%	2.0%
N.A	15.3%	69.9%	28.9%	13.7%	1000.0%	20.2%	58.1%	5.7%	50.0%	40.7%	22.4%
P.P	23.2%	69.7%	23.6%	76.4%	11.5%	32.2%	56.3%	12.8%	50.0%	23.6%	24.8%
R.A.	28.9%	62.5%	29.2%	76.7%	19.8%	28.8%	65.9%	9.8%	60.0%	27.6%	29.0%
BB	25.4%	75.4%	28.6%	80.1%	9.2%	74.3%	20.5%	2.5%	50.0%	18.2%	28.7%
DB	25.3%	69.8%	44.7%	14.5%	114.3%	0.0%	0.0%	9.4%	100.0%	66.0%	26.0%

In the following, we will present the results obtained from the two moments (initial and final testing).

Table 3. *5 meters Speed Running Step Length, left foot*

Statistical Indicators	I.T.	F.T.	Statistical Indicators	Differences F.T.- I.T.
Average	15.8%	23.0%	Difference between averages	7.2%
Median	17.4%	24.8%	Progress rate	45.9 %
Standard deviation	9.7%	6.4%	95% C.I.	(0.016 ; 0.129)
Minimum	0.0%	11.9%	Bilateral Subject T test df	9
Maximum	27.9%	31.7%	t	2.91
Amplitude	27.9%	19.8%	p	0.017
Coef. of variability	61.7%	27.6%	Effect size	0.92

The length of the percentage step, left foot, on average in the 5 meters speed test increased by 7.2% (meaning an increase of 45.9%) in the final test, from 15.8% initially, to 23.0%. The difference between averages is in the confidence interval (0.016; 0.129). The results are dispersed inhomogeneous on initial testing and relatively homogeneous on final testing. The effect size (0.92) indicates a large to very large difference between the averages.

The difference between averages is statistically significant, the value of the significance threshold p = 0.017 < 0.05, for t = 2.91 and 9 degrees of freedom. The graphical representation of the averages and of the differences between the results obtained by each subject at the two tests, are shown in Figure 7.

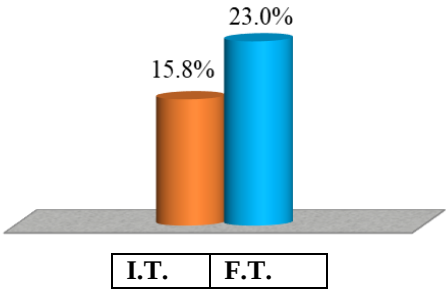

Figure 7. I.T.-F.T. difference 5 m running speed

Table 4. *5 meters Speed Running Stride Length, right foot*

Statistical Indicators	I.T.	F.T.	Statistical Indicator	Differences F.T.- I.T.
Average	63.5%	65.8%	Difference between averages	2.3%
Median	65.2%	64.3%	Progress rate	3.5%
Standard deviation	4.9%	5.2%	95% C.I.	(-0.012 ; 0.057)
Minimum	55.7%	59.6%	Bilateral Subject T test df	9
Maximum	69.8%	75.4%	t	1.49
Amplitude	14.1%	15.8%	p	0.171
Coef. of variability	7.7%	8.0%	Effect size	0.47

The percentage run, right foot, on average in the 5 meters speed test increased by 2.3%, (3.5%) in the final test, from 63.5% initially to 65.8%. The difference of the averages is in the confidence interval (-0.012; 0.057). The results are homogeneous dispersed in both tests. The difference between the averages is statistically insignificant, the value of the significance threshold p = 0.171, for t = 1.49 and 9 degrees of freedom. The averages and the differences between the results obtained by each subject at the two tests are presented graphically in Figure 8.

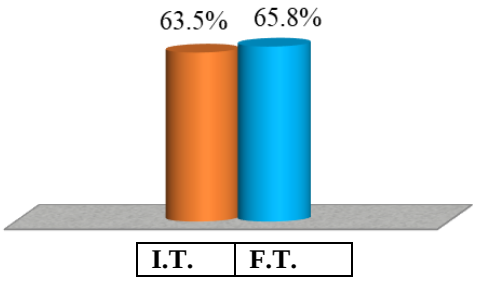

Figure 8. I.T.-F.T. difference 5 m running speed

Table 5. *5 meters Speed Running Flight Time, left foot*

Statistical Indicators	I.T.	F.T.	Statistical Indicators	Differences F.T.- I.T.
Average	21.4%	28.5%	Difference between averages	7.1%
Median	22.9%	28.8%	Progress rate	33.3 %
Standard deviation	12.8%	11.9%	95% C.I.	(-0.002 ; 0.145)
Minimum	0.0%	12.9%	Bilateral Subject T test df	9
Maximum	38.8%	44.7%	t	2.19
Amplitude	38.8%	31.8%	p	0.056
Coef. of variability	59.8%	41.7%	Effect size	0.69

The average percentage time of flight, left foot in the 5 meters speed test increased by 7.1%, (33.3%) in the final test, from 21.4% initially to 28.5%. The difference in averages is in the confidence interval (-0.002; 0.145). The results are inhomogeneous dispersed in both tests. The difference between the averages is statistically insignificant, the value of the significance threshold p = 0.056 (we mention future research on a larger sample of athletes is necessary to provide a clearer image in the case of this parameter - the significance threshold being very close to 0.05), for t = 2.19 and 9 degrees of freedom. The graph in Figure 9 gives the averages and the differences between the results obtained by the participants in the two tests.

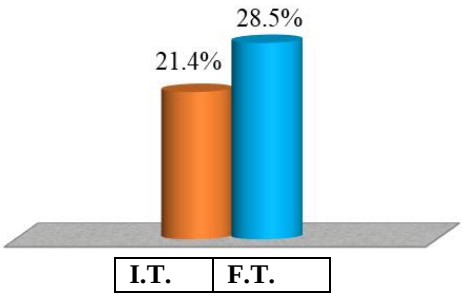

Figure 9. I.T.-F.T. difference 5 m running speed

Table 6. *5 meters Speed Running Contact Time, left foot*

Statistical Indicators	I.T.	F.T.	Statistical Indicators	Differences F.T.- I.T.
Average	46.1%	45.9%	Difference between averages	-0.2%
Median	62.4%	42.6%	Progress rate	0.3%
Standard deviation	30.9%	32.3%	95% C.I.	(-0.114 ; 0.111)
Minimum	3.9%	12.0%	Bilateral Subject T test df	9
Maximum	77.5%	82.5%	t	0.03
Amplitude	73.6%	70.5%	p	0.980
Coef. of variability	67.0%	70.2%	Effect size	0.01

The average percentage time of contact, left foot on the 5-meters running speed test decreased by -0.2%, (0.3%) on the final test, from 46.1% initially to 45.9%. The difference

between the averages is in the confidence interval (-0.114; 0.111). The results are inhomogeneous dispersed in both tests. The difference between the averages is statistically insignificant, the value of the significance threshold p = 0.980, for t = 0.03 and 9 degrees of freedom. In Figure 10 are presented graphically the averages and the differences between the results obtained by athletes.

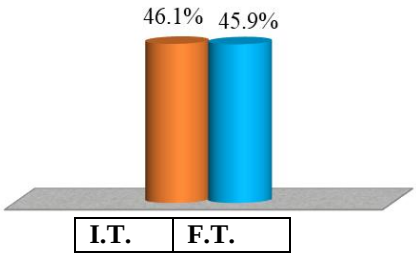

Figure 10. I.T.-F.T. difference 5 m running speed

Table 7. *5 meters Speed Running Contact Phase, left foot*

Statistical Indicators	I.T.	F.T.	Statistical Indicators	Differences F.T.- I.T.
Average	25.3%	50.7%	Difference between averages	25.4 %
Median	16.9%	27.7%	Progress rate	100.3 %
Standard deviation	31.2%	46.8%	95% C.I.	(-0.063 ; 0.570)
Minimum	0.0%	9.2%	Bilateral Subject T test df	9
Maximum	108.3%	125.0%	t	1.81
Amplitude	108.3%	115.8%	p	0.103
Coef. of variability	123.3%	92.3%	Effect size	0.57

The percentage flight phase, left foot, on average at the 5 meters speed test increased by 25.4%, (100.3%) at the final test, from 25.3% initially to 50.7%. The difference of the averages is in the confidence interval (-0.063; 0.570). The results are inhomogeneous dispersed in both tests. The difference between the averages is statistically insignificant, the value of the significance threshold p = 0.103, for t = 1.81 and 9 degrees of freedom. The graphical representation of the results are shown in Figure 11.

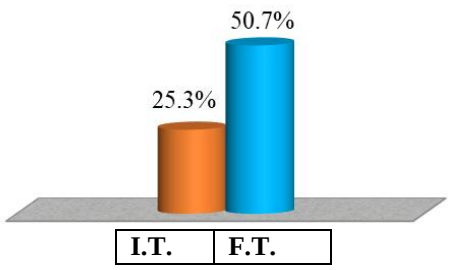

Figure 11. I.T.-F.T. difference 5 m running speed

Table 8. *5 meters Speed Running Foot Flat, left foot*

Statistical Indicators	I.T.	F.T.	Statistical Indicators	Differences F.T.- I.T.
Average	41.1%	42.2%	Difference between averages	1.1%
Median	40.4%	37.3%	Progress rate	2.8%
Standard deviation	24.8%	26.2%	95% C.I.	(-0.189 ; 0.213)
Minimum	0.0%	0.0%	Bilateral Subject T test df	9
Maximum	72.7%	90.9%	t	0.13
Amplitude	72.7%	90.9%	p	0.899
Coef. of variability	60.3%	62.0%	Effect size	0.04

Percentage flat foot phase, left foot, on average in the 5-meters speed test increased by 1.1%, (2.8%) in the final test, from 41.1% initially to 42.2%. The difference of the averages is in the confidence interval (-0.189; 0.213). The results are inhomogeneous dispersed in both tests. The difference between the averages is statistically insignificant, the value of the significance threshold p = 0.899, for t = 0.13 and 9 degrees of freedom. The results obtained by the participants are presented graphically in Figure 12.

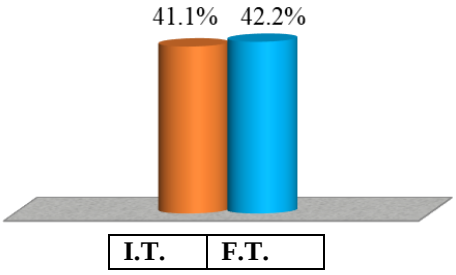

Figure 12. I.T.-F.T. difference 5 m running speed

Table 9. *5 meters Speed Running Propulsive Phase, left foot*

Statistical Indicators	I.T.	F.T.	Statistical Indicators	Differences F.T.- I.T.
Average	28.0%	44.6%	Difference between averages	16.6 %
Median	29.9%	43.3%	Progress rate	59.5 %
Standard deviation	19.5%	29.3%	95% C.I.	(-0.038 ; 0.371)
Minimum	0.0%	0.0%	Bilateral Subject T test df	9
Maximum	58.9%	104.5%	t	1.84
Amplitude	58.9%	104.5%	p	0.099
Coef. of variability	69.6%	65.6%	Effect size	0.58

Percentage propulsion phase, left foot, on average in the 5-meters speed test increased by 16.6%, (59.5%) in the final test, from 28.0% initially to 44.6%. The difference of the averages is in the confidence interval (-0.038; 0.371). The results are inhomogeneous dispersed in both tests. The difference between the averages is statistically insignificant, the

value of the significance threshold p = 0.099, for t = 1.84 and 9 degrees of freedom. Figure 13 shows the results obtained by athletes.

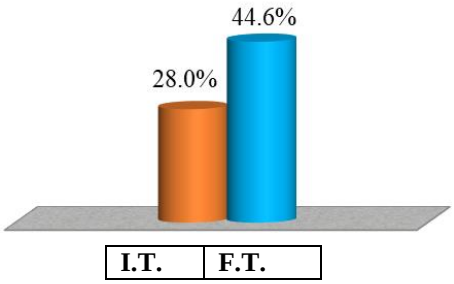

Figure 13. I.T.-F.T. difference 5 m running speed

Table 10. *5 meters Speed Running Pace (steps/min), right foot*

Statistical Indicators	I.T.	F.T.	Statistical Indicators		Differences F.T.- I.T.
Average	7.8%	9.1%	Difference between averages		1.3%
Median	6.6%	7.2%	Progress rate		16.5 %
Standard deviation	6.2%	7.6%	95% C.I.		(-0.029 ; 0.055)
Minumum	1.8%	2.5%	Bilateral Subject T test	df	9
Maximum	22.2%	28.6%		t	0.69
Amplitude	20.4%	26.1%		p	0.507
Coeff. of variability	79.8%	83.3%	Effect size		0.22

The average of the steps per minute, right foot, in the 5 meters speed test increased by 1.3%, (16.5%) in the final test, from 7.8% initially, to 9.1%. The difference between averages is in the confidence interval (-0.029; 0.055). The results are inhomogeneous dispersed in both tests. The difference between the averages is statistically insignificant, the value of the significance threshold p = 0.507, for t = 0.69 and 9 degrees of freedom. Figure 14 presents graphically the obtained values.

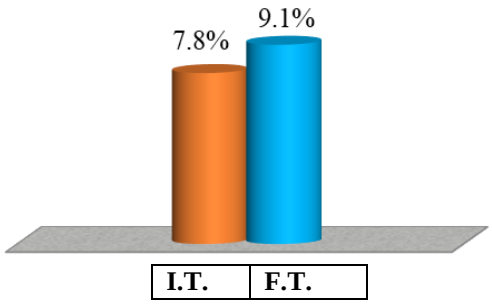

Figure 14. I.T.-F.T. difference 5 m running speed

Table 11. *5 meters Speed Running Height, left foot*

Statistical Indicators	I.T.	F.T.	Statistical Indicators		Differences F.T.- I.T.
Average	30.5%	63.8%	Difference between averages		33.3 %
Median	16.7%	50.0%	Progress rate		108.9 %
Standard deviation	39.8%	35.2%	95% C.I.		(0.128 ; 0.537)
Minimum	0.0%	20.0%	Bilateral Subject T test	df	9
Maximum	120.0%	140.0%		t	3.68
Amplitude	120.0%	120.0%		p	0.005
Coef. of variability	130.2%	55.2%	Effect size		1.16

The percentage height, left foot, on average in the 5 meters speed test increased by 33.3%, (108.9%) in the final test, from 30.5% initially, to 63.8%. The difference in averages is in the confidence interval (0.128; 0.537). The results are inhomogeneous dispersed in both tests. The effect size (1.16) indicates a very large difference between the averages. The difference between the means is statistically significant, the value of the significance threshold p = 0.005, for t = 3.68 and 9 degrees of freedom. Figure 15 shows the results obtained by the participants at the initial and final testing.

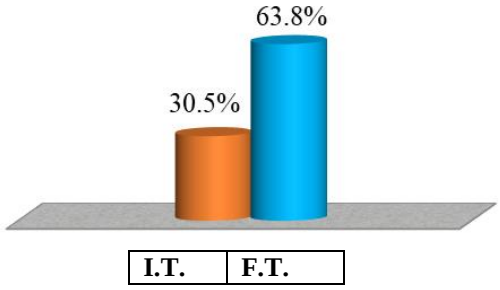

Figure 15. I.T.-F.T. difference 5 m running speed

Table 12. *5 meters Speed Running Stride Angle, left foot*

Statistical Indicators	I.T.	F.T.	Statistical Indicators		Differences F.T.- I.T.
Average	24.9%	42.8%	Difference between averages		17.9 %
Median	14.8%	34.2%	Progress rate		71.9 %
Standard deviation	34.8%	32.8%	95% C.I.		(0.018 ; 0.340)
Minimum	0.0%	11.3%	Bilateral Subject T test	df	9
Maximum	116.2%	120.0%		t	2.52
Amplitude	116.2%	108.7%		p	0.033
Coef. of variability	140.1%	76.6%	Effect size		0.80

The percentage inclination angle, left foot, on average in the 5 meter running test increased by 17.9%, (71.9%) in the final test, from 24.9% initially, to 42.8%. The difference between the averages is in the confidence interval (0.018; 0.340). The results are inhomogeneous dispersed in both tests. The effect size (0.80) indicates a strong difference between the averages. The difference of the means is statistically significant, the value of the significance threshold p = 0.033 (< 0.05), for t = 2.52 and 9 degrees of freedom. Figure 16 shows the results registered.

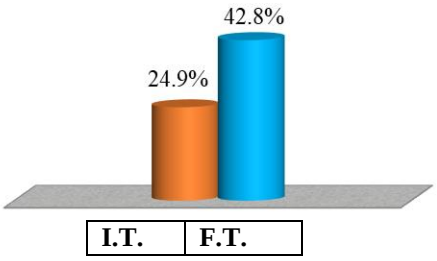

Figure 16. I.T.-F.T. difference 5 m running speed

Table 13. *5 meters Speed Running Speed (m/s), left foot*

Statistical Indicators	I.T.	F.T.	Statistical Indicators		Differences F.T.- I.T.
Average	15.0%	22.2%	Difference between averages		7.2%
Median	18.4%	24.2%	Progress rate		48.6 %
Standard deviation	11.3%	7.9%	95% C.I.		(0.004 ; 0.142)
Minimum	0.0%	2.0%	Bilateral Subject T test	df	9
Maximum	30.8%	29.0%		t	2.38
Amplitude	30.8%	27.0%		p	0.041
Coef. of variability	75.3%	35.5%	Effect size		0.75

The speed (m/ s) expressed as a percentage, left foot, on average at the 5 meters speed test increased by 7.2%, (48.6%) at the final test, from 15.0% initially to 22.2%. The difference of the averages is in the confidence interval (0.004; 0.142). The results are inhomogeneous dispersed in both tests. The effect size (d = 0.75) indicates a moderate to large difference between the averages. The difference between the means is statistically significant (p = 0.041), for t = 2.38 and 9 degrees of freedom. The graph in figure 17 gives the averages and the differences between the results obtained by each subject at the two tests.

Figure 17. I.T.-F.T. difference 5 m running speed

Table 14. *5 meters Speed Running Average Speed, right foot*

Statistical Indicators	I.T.	F.T.	Statistical Indicators		Differences F.T.- I.T.
Average	14.6%	18.4%	Difference between averages		3.8%
Median	16.5%	19.6%	Progress rate		25.9%
Standard deviation	5.3%	3.0%	95% C.I.		(-0.002 ; 0.078)
Minnimum	4.9%	13.7%	Bilateral Subject T test	df	9
Maximum	21.6%	21.7%		t	2.14
Amplitude	16.7%	8.0%		p	0.061
Coef. of variability	36.1%	16.5%	Effect size		0.68

As a percentage, the average speed, right foot, increased at the final test by 3.8%, (25.9%) at the 5 meters speed test, from 14.6% initially, to 18.4%. The difference in averages is in the confidence interval (-0.002; 0.078). The results are dispersed inhomogeneous on initial testing and relatively homogeneous on final testing. The difference between the means is statistically insignificant, the value of the significance threshold p = 0.061, for t = 2.14 and 9 degrees of freedom. In Figure 18 are presented graphically the averages and the differences between the results obtained by the athletes.

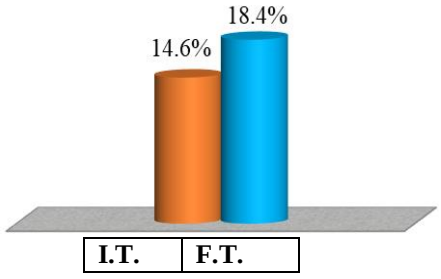

Figure 18. I.T.-F.T. difference 5 m running speed

Conclusion

In order to obtain remarkable performances, in addition to the anthropometric and somatic indices that meet the requirements of football-tennis athletes, there must be great will, which involves perseverance, ambition, devotion or desire to overcome obstacles (the desire to be better than your opponent is playing, also, an essential role).

These sportswomen are distinguished by a special agility regarding the technical-tactical executions of the Football-Tennis game, as well as by a special desire to obtain great victories and notable performances.

By comparing the results from the initial and final tests obtained with the OptoJump device for running on 5 meters speed, there are significant positive differences. It can be argued that by applying a centralised training programme, which included both physical and technical-tactical exercises specific to the game of football-tennis, there was an increase in speed which was an important factor in obtaining the first place at the European Football-Tennis Championship.

References

Debaere, S., Jonkers, I., & Delecluse, C. (2013). The contribution of step characteristics to sprint running performance in high-level male and female athletes. *Journal of Strength and Conditioning Research, 279*(1), 116-124. https://doi.org/10.1519/jsc.0b013e31825183ef

Federația Română de Fotbal-Tenis. (n.d.). *Istoric* [History]. http://www.frft-caj.ro/frft.php?lang=ro&pagina=1

González-De Los Reyes, Y., Fernández-Ortega, J., & Garavito-Peña, F. (2019). Características de fuerza y velocidad de ejecución en mujeres jóvenes futbolistas [Characteristics of strength and execution speed in young female football players]. *Revista Internacional De Medicina Y Ciencias De La Actividad Física Y Del Deporte, 19*(73), 167-179. https://doi.org/10.15366/rimcafd2019.73.012

Helgerud, J., Rodas, G., Kemi, O. J., & Hoff, J. (2011). Strength and endurance in elite football players. *International Journal Sports Medicine, 32*(9), 677-82. https://doi.org/10.1055/s-0031-1275742

History of Football-Tennis. (2011). http://www.futnet.eu/about-futnet/history1987-2011/

Impellizzeri, F. M., Rampinini, E., Castagna, C., Bishop, D., Ferrari Bravo, D., Tibaudi, A., & Wisloff, U. (2008). Validity of a repeated-sprint test for football. *International Journal Sports Medicine, 29*(11), 899-905. https://doi.org/10.1055/s-2008-1038491

Kotzamanidis, C., Chatzopoulos, D., Michailidis, C., Papaiakovou, G., & Patikas, D. (2005). The effect of a combined high-intensity strength and speed training program on the running and jumping ability of soccer players. *Journal of Strength and Conditioning Research, 19*(2), 369-375. https://doi.org/10.1519/r-14944.1

Kraft, E., Culver, D. M., & Din, C. (2019). Exploring women-only training program for coach developers. *Women in Sport and Physical Activity Journal, 28*(2), 173-179. http://doi.org/10.1123/wspaj.2019-0047

Manson, S. A., Brughelli, M., & Harris, N. K. (2014). Physiological characteristics of international female soccer players. *Journal of Strength and Conditioning Research, 28*(2), 308-318. https://doi.org/10.1519/JSC.0b013e31829b56b1

Microgate. (2014). *What is OptoJump*. http://www.optojump.com/What-is-Optojump.aspx

Mirella, R. (2001). *Nuevas metodologías del entrenamiento de la fuerza, la resistencia, la velocidad y a flexibilidad* [New methodologies of strength, endurance, speed and flexibility training]. Paidotribo.

Mujika, I., Santisteban, J., Impellizzeri, F. M., & Castagna, C. (2009). Fitness determinants of success in men's and women's football. *Journal of Sports Sciences, 27*(2), 107-114. https://doi.org/10.1080/02640410802428071

Nicolao, A. L. A., Pedrinelli, A., Zogaib, P. S. M., Orbetelli, R., & Neto, T. L. (2010). Influence of sexual maturation in lactate threshold in female soccer players. *Revista Brasileira De Medicina Do Esporte, 16*(5), 335-338. https://doi.org/10.1590/S1517-86922010000500003

Nikolaidis, P. T. (2014) Physical fitness in female soccer players by player position: A focus on anaerobic power. *Human Movement, 15*(2), 74-79. https://doi.org/10.2478/humo-2014-0006