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OPTIMIZING THE COORDINATION SKILLS OF 12-YEAR-OLD TENNIS PLAYERS BY USING UNCONVENTIONAL (ADAPTED) TRAINING METHODS

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ABSTRACT. The modern tennis is characterized by the restructuring of training content in the context of great performance of nowadays sports. Latterly, tennis implies a specific background of players' skills, which includes, first of all, a multifaceted training, the manifestation of a great level of creation, tactical inventiveness that can only be expressed by individuals who have reached a high level of technical, physical and psychological abilities. The significance of physical training is unanimously acknowledged, as it is the support of the players' activity, which can use their technical-tactical and psychological possibilities during training sessions and competitions. Under these circumstances, the need to apply "unconventional" training methods and create appropriate drills to positively influence the performance capability is, from our point of view, an essential preoccupation of the motricity specialist. Current performance training cannot be anchored in definitive template shapes.

Keywords: *tennis, performance, coordination abilities, unconventional drills*

REZUMAT. ***Optimizarea capacităţilor coordinative în jocul de tenis utilizând metode neconvenţionale la copiii de 12 ani.*** Tenisul modern se caracterizează prin restructurarea conținutului pregătirii, în contextul amplificării spectacolului sportiv. Azi, tenisul presupune un fond specific de aptitudini ale jucătorilor, care include în primul rând o pregătire polivalentă, manifestarea unei mari libertăți de creație, de inventivitate tactică, ce nu poate fi exprimată decât de indivizii care au atins un înalt nivel de măiestrie tehnică, fizică si psihologică. Însemnătatea pregătirii fizice este unanim recunoscută, deoarece constituie suportul activităţii jucătorilor care astfel îşi pot valorifica posibilităţile tehnico-tactice si psihologice.

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În aceste condiţii, necesitatea aplicării unor mijloace şi metode de pregătire inedite, "neconvenţionale" adecvate influenţării pozitive a capacităţii de performanţă, reprezintă din punctul nostru de vedere o preocupare esenţială a specialistului din domeniul motricităţii.

Cuvinte cheie: *tenis de câmp, performanţă, capacitate coordinativă, mijloc nespecific*

INTRODUCTION

The motor drills practiced and developed in the aquatic environment have specific characteristics due to the nonspecific environment (timing, balancing, modified force parameters) and all the improved motor abilities can be efficiently transferred on the tennis court (positive transfer).

The topicality of the work is that it is in line with the concerns of optimizing sports training in all its aspects (including the development of motor skills). The practical value of the paper is that it demonstrates the effectiveness of adapted unconventional drive systems and highlights the role of coordinating skills development in the sports training process.

Hypothesis

Starting from the premise that the optimization of sports training in the actual game of tennis is conditioned by the level of coordination capacities (essential elements of the motoring profile of the player) we will organize an experimental study that will confirm / invalidate the hypothesis that the use of tennis-specific motor-driven structures developed in the aquatic environment will have positive effects in optimizing the 12-year tennis player motor profile by increasing the specific parameters of the coordinating capacities .

Objectives

Selection of relevant bibliographic materials in current field of tennis training and theoretical foundation of the above mentioned topic, elaboration of an unconventional methodical line (developed in the aquatic environment) dedicated to the optimization of the coordination capacities, the means are taken and adapted from the tennis-specific motor structures, the increase of the training efficiency in the field of tennis.

Means and methods

Subjects

The subjects of the experiment were in number of 12 which were organized in two groups (experimental and control). The tennis players are aged between eleven and twelve years.

They have been training at different tennis clubs in Bistrita-Nasaud county having a five to six years of experience, currently playing tennis at advanced level. Also the junior tennis players involved in the experimental research have been participated at various national tournaments annually.

Experiment

The junior tennis players are engaged in performance activity with numerous participations competitions. While the control group carried out a standard training program according to the conventional training plan, the experimental group took part in adapted training sessions (where drills are adapted to the aquatic environment), internships included in the conventional annual plan. The experiment was conducted over a six-month period.

Table 1. Initial evaluation
Speed agility (meters/sec.) and coordination drills

Experimental group

Nr. Crt.	Name	6x20m	5m	10m	Hexagon	Diamond	Shuffle Steps
1	A. B.	4.66	1.91	2.80	10.90	21.40	8.79
2	F. N.	4.78	1.94	2.89	10.99	22.00	8.80
3	A. M.	4.39	1.79	2.77	10.48	21.10	8.39
4	V. D.	4.29	1.70	2.75	9.92	21.19	8.82
5	I. S.	4.80	1.97	2.90	10.92	24.10	9.00
6	C. N.	4.47	1.70	2.75	10.69	23.00	7.99

Control Group

Nr. Crt.	Name	6x20m	5m	10m	Hexagon	Diamond	Shuffle Steps
1	M. P.	4.96	1.99	3.00	11.10	24.90	9.10
2	D. G.	4.39	1.80	2.78	11.00	23.00	9.00
3	M. S.	4.90	1.90	2.85	11.20	23.10	8.90
4	P. P.	4.70	1.88	3.00	10.90	22.90	8.75
5	D. V.	4.35	1.77	2.70	10.50	21.45	8.60
6	G. U.	4.25	1.69	2.70	9.90	21.39	8.35

Table 2. Final evaluation,
Speed agility(meters/sec.) and coordination drills

Experimental group

Nr. Crt.	Name	6x20m	5m	10m	Hexagon	Diamond	Shuffle Steps
1	M. P.	4.95	2.00	3.05	11.05	24.40	9.00
2	D. G.	4.30	1.77	2.73	11.09	22.95	8.92
3	M. S.	4.83	1.88	2.80	11.12	23.00	8.93
4	P. P.	4.75	1.84	2.96	10.88	22.79	8.41
5	D. V.	4.34	1.75	2.72	10.44	21.00	8.43
6	G.U.	4.22	1.68	2.66	9.92	20.90	7.90

Control Group

Nr. Crt.	Name	6x20m	5m	10m	Hexagon	Diamond	Shuffle test
1	A. B.	4.50	1.90	2.70	10.10	20.90	8.80
2	F. N.	4.54	1.92	2.81	10.15	21.00	8.61
3	A. M.	4.28	1.75	2.74	10.40	20.45	8.00
4	V. D.	4.20	1.61	2.73	9.85	20.49	7.93
5	I. S.	4.72	1.85	2.88	10.19	22.85	7.99
6	C. N.	4.40	1.70	2.69	10.00	21.90	7.50

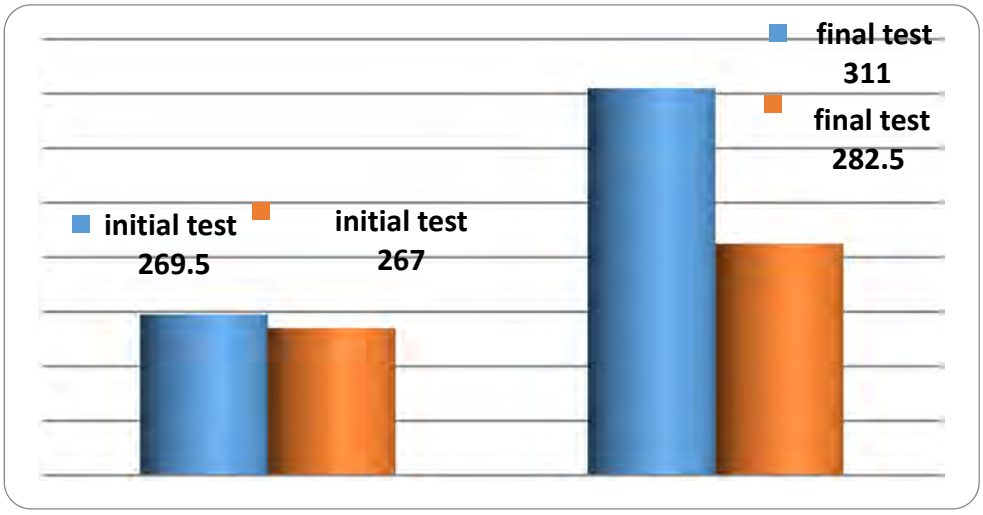

Fig. 1. Running test (6x20m) - average values

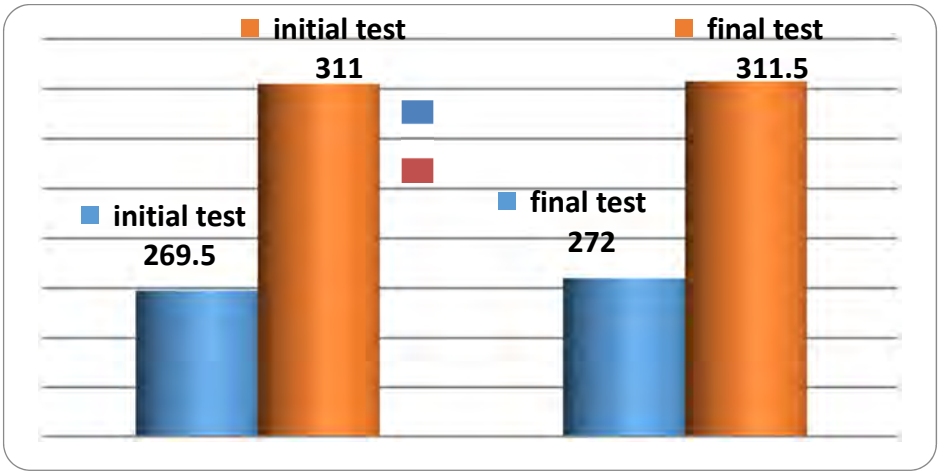

Fig. 2. Diamond test – average values

We will further demonstrate that the rate of progress and its dynamics is significantly different in the experimental group compared to the control group, evidenced by the calculated statistical indicators, but also by the diagrams built for each test.

For centralized data in the tables below, we make the following points:

- C represents the control group (control) and E the experimental group;
- IT is the initial test, and TF final testing;
- Initial-final student is the result of the T test applied to one of the groups for the two tests;
- Student Final is the T test for final testing, applied for the two groups;
- t represents the experimentally determined value at the T test;
- F represents the value recorded by the ANOVA method at the final test for the two groups;
- the critical value of F in the Fisher table used at the significance threshold of 0.05 with 1 and 18 degrees of freedom and calculated with the FINV () function of the Microsoft Excel application is 4.4138 (F (0.05, 1.18) = 4.4138);
- the critical values of t in the Fisher table used at the significance threshold of 0.05 and calculated using the TINV () function in the Microsoft Excel application are as follows:
- for initial T-test T = 2.262 for 9 degrees of freedom;
- for final test T: t = 2,1009 for 18 degrees of freedom;
- p represents the significance threshold (probability), the one used by us is 0.05.

Table 3. Diamond test/statistics

Diamond test											
						Student initial-final		Student final		ANOVA	
Group		X	S	m	Cv	t	P	T	P	F	P
	TI	269.5	32.782	10.366	12.164	5.326	<0.05	2.334	<0.05	5.352	<0.05
E	TF	311	29.79	9.42	9.58						
	TI	267	25.733	8.137	9.638	2.435	<0.05				
C	TF	282.5	24.54	7.76	8.68						

- mean values indicate an increase between tests by 41.5 degrees in the experimental group and by 15.5 grades in the control group, significant for both groups:

Experiment group: $t(9)=5.326>2.262$

Control group: $t(9)=2.435>2.262$

- the coefficient of variation indicates a high homogeneity in both groups is improving compared to initial testing, especially in the first group;
- the values of t and F in the final test confirm the significant differences between the two groups:

$t(18)=2.334>2.1009$

$F(1,18)=5.352>4.413$

Table 4. Running test/statistics

Running test											
						Student initial- final		Student final		ANOVA	
Group		X	S	m	Cv	t	P	t	P	F	P
	TI	272	23.944	7.571	8.803	6.353	<0.05	3.144	<0.05	7.379	<0.05
E	TF	311.5	24.72	7.81	7.93						
	TI	264	29.135	9.213	11.036	2.143	>0.05				
C	TF	274	28.48	9.01	10.39						

- mean values show an increase of 39.5 degrees in the experimental group and only 10 grades in the control group, significant only for the first group, also evidenced by the

Meaning tests:

experiment group: $t(9)=6.353>2.262$

control group: $t(9)=2.143<2.262$

-the coefficients of variation show very good values, with a slight improvement over the values from initial testing

-the values of t and F at the final testing confirms the semnificative differences between the two groups:

$t(18)=3.144>2.1009$

$F(1,18)=7.379>4.413$

Table 5. Initial evaluation - Ball speed (km/h) body and limbs coordination (experimental group)

Nr. Crt.	Name	Speed serve 1	Speed serve 2	Speed forehand	Speed backhand	High
1	A.B.	69	64	58	56	big
2	F.N.	70	66	61	57	big
3	A.M.	68	63	59	58	big
4	V.D.	71	37	60	57	big
5	I.S.	79	72	70	55	big
6	C.N.	71	65	61	59	big

Table 6. Final evaluation - Ball speed (km/h) body and limbs coordination (experimental group)

Nr. Crt.	Name	Speed serve 1	Speed serve 2	Speed forehand	Speed backhand	High
1	M.P.	67	61	61	58	big
2	D.G.	77	65	63	62	big
3	M.S.	69	62	59	59	big
4	P.P.	67	60	57	56	big
5	D.V.	67	62	60	57	big
6	G.U.	73	68	68	60	big

Table 7. Initial evaluation - Ball speed (km/h) body and limbs coordination (experimental group)

Nr. Crt.	Name	Speed serve 1	Speed serve 2	Speed forehand	Speed backhand	High
1	A.B.	84	77	74	73	Medium
2	F.N.	82	77	76	76	Medium
3	A.M.	80	71	72	71	Medium
4	V.D.	83	73	72	70	Medium
5	I.S.	89	80	85	82	Medium
6	C.N.	85	75	76	77	Medium

Table 8. Final evaluation - Ball speed (km/h) body and limbs coordination (control group)

Nr. Crt.	Name	Speed serve 1	Speed serve 2	Speed forehand	Speed backhand	High
1	M.P.	76	71	71	68	Medium
2	D.G.	83	75	70	71	Medium
3	M.S.	75	68	69	68	Medium
4	P.P.	73	67	66	64	Medium
5	D.V.	72	65	69	65	Medium
6	G.U.	79	73	75	70	Medium

Table 9. Forehand test/statistics

Forehand test											
Group		X	S	m	Cv	Student initial		Student final		ANOVA	
						t	P	t	P	F	P
E	TI	15.08	3.312	1.047	21.962	2.816	<0.05	3.231	<0.05	5.258	<0.05
	TF	14.75	3.675	1.162	24.91						
C	TI	15.27	2.86	0.904	18.729	1.869	>0.05				
	TF	15	3.093	0.978	20.62						

The average values indicate a few seconds improvement of the values recorded between the tests at both groups, significant improvement only for the experimental group:

Experiment group: t(9)=6.353>2.262

Control group: t(9)=2.143<2.262

- Homogeneity improves in both groups, more significant in the control group;
-The significant differences between the two groups from the final testing are highlighted by the values of t and F:

T (18)=3.231>2.1009

F (1,18)=5.258>4.413

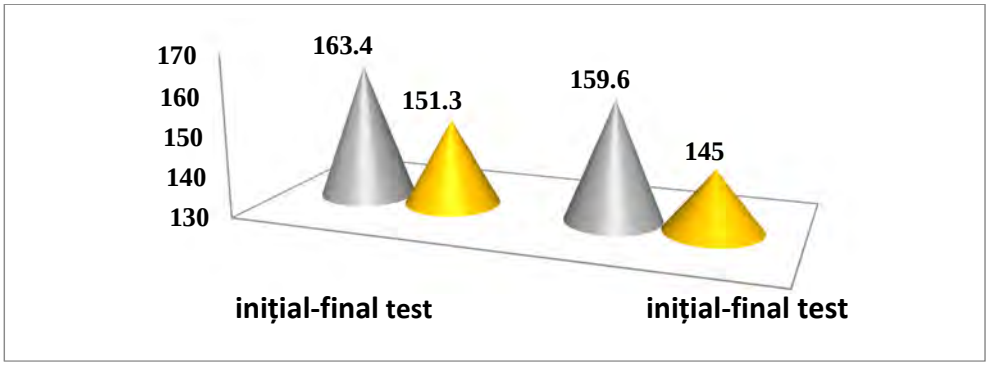

Fig. 3. Forehand/ average representation

Table 10. Backhand test/statistics

Backhand test											
						Student initial- final		Student final		ANOVA	
Group		X	S	m	Cv	t	P	t	P	F	P
E	TI	272	23.944	7.571	8.803	6.353	<0.05	3.144	<0.05	7.379	<0.05
	TF	311.5	24.72	7.81	7.93						
C	TI	264	29.135	9.213	11.036	2.143	>0.05				
	TF	274	28.48	9.01	10.39						

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Meaning tests:

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- the coefficients of variation show very good values, with a slight improvement over the values from initial testings
- the values of t and F at the final testing confirms the semnificative differences between the two groups:

$t(18)=3.144>2.1009$

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The means applied by the programme adapted, unconventional synthetic refer to: trips in water, aquatic games (volleyball, water polo, badminton, imitative exercises coup state and coup state without using rockets lapel linking). All these tools are developed in the basin with water of various depths (knee, joints, elbow, coxofemural resulting in the joints of the scapular-humeral). In order to optimize the specific. Biomechanics of impact (the right shots and backhand), integrated motor components specific to these processes but adapted to the peculiarities of the aquatic environment and integrated methodological structures focused on these objectives. So I adapted the tennis racket (removing linking in the initial phase, then increasing the complexity of the executions I added linking and have increased resistance to the final stage. Equipment used: rockets, fireballs, whistle, dividing strips, radar, timer ball coach.

Results and Discussions

There were significant differences between experimental and control group, where the ball speed behind backhand and forehand stroke was significantly higher in the experimental group.

Higher values were also found in favor of experimental group regarding the speed and agility drills which are common in each sequence during point in the game of tennis.

In the present study we had used similar exercises as on the tennis court but with greater opposition involving the water in the equation.

There is no unique model which can be generally applied when it comes to develop better speed and agility of the limbs, apart or as a entire unit, in the game of tennis.

Such an experiment can be used or performed easily by individuals who are not comfortable using high performance technology as long as there is no need of such things.

CONCLUSIONS

Coordinative capacities in the aquatic environment (repetitions characterized by higher concentration parameters - CNS and skeletal muscles) produce positive motor accumulations in the tennis player's profile.

The responsiveness seen in the context of the specific manifestation of the lower limbs (forms of movement in different directions) is significantly improved.

The capacity of the upper limbs in relation to the three relevant sequences of the basic technical procedures (forehand and backhand stroke) increases.

There is an improvement in the practical way of dealing with unpredictable situations in training and competition.

The motor program development has had a strong impact on the mental capacity (self-confidence, self-improvement, mental strengths).

The results obtained allow the validation of the research hypothesis and therefore the implementation of unconventional means and methods in tennis reveals beneficial effects that are found in the performances of 12 years old tennis players.

We recommend using these programs also in early stages because the motor profile of the children involved in sports performance is formed during this period, and the diversified and adapted methods and means (which succeed in capturing the interest) have to be integrated into the conventional sports training program.

Conflicts of interests

The authors have no conflicts of interests to declare.

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