

Retrospective analysis of junior female handball players' priorities

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Abstract

Purpose: fulfillment of retrospective analysis of junior female handball players' tactic priorities.

Material: in the research junior female handball players of 15-16 yrs age (n=60) participated. The researches were conducted in 2006, 2010 and 2016 on the base of sport schools and physical culture colleges of Ukraine. We used author's programs «Balltest» and «Handball skills».

Results: indicators of junior female handball players' abilities and tactical thinking effectiveness in different periods of the research were received. Correlations of these indicators with physical potentials and throw fitness point at tactical priorities of the players. Comparative characteristic showed that junior female handball players of 2016 year of the research had better abilities for solution of complex team tasks with low sensor indicators. We found handball players' preferences to defensive and attacking actions in central zone of site.

Conclusions: by universal character of tactic priorities junior female handball players of 2016 year of the research yield to the players of 2006 and 2010 years of the research. Junior female handball players of 2016 year of the research prevail in successful mental solution of position defense tactic tasks, especially in readiness to act as supporters.

Keywords: junior female handball players, tactical priorities, tactical thinking, situational thinking, attack, defense.

Introduction

Striving for show value and records, modern sports reached the level of athletes' contest at extreme of human potentials. Such athletes' performances are pointed at a fan as an active participant of sport action [4]. Spectator has a demand – to enjoy the fight of opponents. In this case show value of sports is defined as “fight of characters and tactical plans” [4]. Especially it is noticeable in team kinds of sports. By the words of D. Alberto Lorenzo Calvo [19], sport game teams have their own concept of success. It implies individual sportsmanship of players and their actions' coordination in constantly changing site situations and resistance of opponent [19]. To ensure such activity in handball the players shall have the following: quickness of perception [39]; ability to predict situations, solve them and take adequate solutions [5]; to have cognitive abilities [17, 18, 20].

Analysis of scientific works showed that study of athlete's cognitive abilities is still an urgent problem. Such studies have different orientation:

Study of efficient team thinking, based on non-verbal, emotional solutions [39];

Tactical thinking with expected feedback of the taken decision. In this case intuitive, analytical and subjectively oriented models of game situations are used [44];

Intuitive thinking as quicker and more effective mean of taking correct decision in definite game episode [41];

Emotional component of decision-taking. It is necessary for developing of own behavioral style and confidence in critical game situations [22, 38];

Testing of perceptive-cognitive differences between age groups, licenses levels of different age coaches [28];

Correlation between motivation, purpose and perception level of motivation climate and their influence on cognitive and somatic components of young athletes'

contest anxiety [27, 30];

Success in training of general and special physical qualities at different stages of athletes' training [31];

Impulse and subjective indicators of athletes' reaction to physical load [37];

Indicators for prediction of martial arts athletes successes [35, 40];

Optimization of physical loads [34] considering athletes' individual characteristics [25, 26] and health indicators [42].

Other works were directed at solution of problem of athletes' cognitive sphere. They expanded knowledge about handball players' tactical thinking [10, 12, 13]. Tactical thinking is defined as ability to choose rational decision in game situation [14]. It is a complex of brain operations, ensured by potentials of human supreme nervous system's activity [8] and individual-typological specificities of neuro-physiological processes [10]. The method of handball players' tactical thinking definition was worked out on the base of these principles [3]. It included game situations' models, which were displayed with variant of complex and simple tasks' solution. Usage of virtual board for dynamic presentation of tactic tasks is shown in other methodic [17, 44]. This methodic is characterized by the presence of program algorithm and division into blocks.

Among other researches one can find the following tactical models of athletes' and teams' behavior:

Methodology of assessment of tactical attacking behavior in handball [32];

Usage of gradient contest. The authors found that usage of gradient contest can increase success of students with higher and lower qualification level [33];

Working out of strategy: for prevention from young athletes, who are trained in elite educational structures, “burning out”; for facilitating long term participation and increase of welfare in sport activity [36].

Tactical thinking is a part of athlete's cognitive strategies [6]. There is interconnection of anthropometric, technical and physical indicators of an athlete and realization of his/her tactical plan [15, 19, 43]. Computer program permits to find tactical preferences of elite female handball players for controlling over competition functioning [13]. Usage of such program in case of junior female handball players will provide information about tactical priorities. In its turn, it will permit to raise effectiveness of training process.

The purpose of the work is to fulfill retrospective analysis of junior female handball players' tactic priorities by their tactical thinking, considering physical indicators and throw fitness. For this purpose it is necessary: 1) to study characteristics of tactical thinking, physical indicators and throw fitness of different research periods' junior female handball players; 2) determine tactical preferences of junior female handball players to actions in different game situations.

Material and methods

Participants: retrospective analysis was fulfilled on identical by age and qualification groups of junior female handball players tested in different periods. In the research junior female handball players of 15-16 yrs (1st sport category) participated. 20 athletes, tested in 2006 and 22 – tested in 2010 – pupils of Zaporozhye and Krivoy Rog sport schools; 18 athletes, tested in 2016, were the students of Kherson and Brovary higher physical culture colleges. The researches were conducted in leading handball schools, which successfully train athletes for teams of masters and combined teams of Ukraine. All participants gave consent for participation in the research.

Organization of the research: junior female handball players were tested by computer program «Handball skills» [13]. The program is based on two tests for handball players' tactical thinking. These tests were worked out with the help of virtual board for presentation of different complexity game situations' schemes. First test «Balltest» [3] consisted of 4 blocks: tactical thinking in attack; tactical thinking in defense; situational thinking in attack and situational thinking in defense. Each block consisted of 100 schemes with variants of solution, which were positively assessed by experts. In the process of testing 15 game situations, arbitrary chosen by computer, were displayed. Every schema was displayed during 7.33 sec. for analysis and taking decision. By blocks we determined

coefficient of thinking, mean time of correct decision-taking and calculated effectiveness of thinking. The methodic of tactical thinking finding was experimentally tested on handball players, basketball players and football players of different age. Informative value and reliability of this methodic has been proved in other researches [1, 10, 13].

The second test [12] included 400 schemes from «Balltest». The test consisted of three blocks: situations in left, right and central parts of site. 30 schemes of game situations, arbitrary chosen by computer, were displayed (10 situations for every zone). On the base of coefficient and mean time of correct decision taking we determined territory priority of players' tactical thinking [12].

In creation of «Handball skills» computer program tactical thinking indicators and main factors, which to the largest extent influence on players' mental actions in different game situations, were considered. They are: body parameters, quickness and accuracy of throws. That is why in formulas of «Handball skills» program the following indicators were introduced: tactical thinking; body length; speed of 28 meters' run; accuracy and quickness of four throws from 7 meters' distance to squares 40x40 cm (special screen). At the end of experiment we received information, which permitted to find territorial and tactical preferences of junior female handball players.

Statistical analysis: all experimental data were processed with the help of Excel program.

Results

Before solution of tactical task athletes create own mental plan of actions. Mental planning is interconnected with tactical thinking and player's potentials in realization of his/her ideas. It forms players' tactical priorities. Our methodic of tactical priorities determination is not intended for preparation of handball player to game with definite opponent. The methodic informs about mental tactical schema of actions, which can be effectively used by a coach.

We provide the data of junior female handball players' tactical priorities in retrospective analysis, which are not connected with game with definite opponent. We compared junior female handball players' indicators of 2006, 2010 and 2016 years of the research. Analysis of the data showed that in 2006 and 2010 years indicators of junior female handball players did not differ noticeably. That is why we present results of 2006 and 2016 years

Table 1. Fitness of junior female handball players

Description of indicators	Periods of the research	
	2006 year (n=20)	2016 year (n=18)
Accuracy of 7 meters' throws from 4 (quantity)	2,78±0,17	1,61±0,21*
Time of 7 meters throws' fulfillment (sec.)	4,67±0,20	6,68±0,28*
Time of 28 meters' distance run (sec.)	4,59±0,15	4,61±0,12
Body length (cm)	169,6±1,42	167,5±1,36

Note: *p<0.05 – comparing with indicators of 2006

of the research. Difference between indicators was determined in respect to the second group of the tested.

In the process of the researches we found no distinctions in body length and quickness. But handball players of 2006 year of the research had better throw fitness by accuracy by 42% and by quickness – by 43% (see table 1).

Junior female handball players, tested in 2016, demonstrated higher qualitative indicators of tactical thinking in attack – by 54% and in defense – by 45% (solution of complex tactic multiple tasks). Handball players, tested in 2006, had better quality of situational thinking in attack – by 21% and in defense – by 37% (solution of simple tasks). Both groups had equal quality of thinking in attack. With it, handball players of 2006 had better quality of thinking in defense by 6% (see table 2).

Junior female handball players, tested in 2006, demonstrated quickness of correct decision taking in situational tasks' solution in attack by 11% and in defense – by 12%. Quickness of tactical tasks' solution (independent on game phase) was equal (see table 3).

Junior female handball players, tested in 2006, demonstrated higher effectiveness of situational tasks' solution in attack – by 28% and tactical tasks in attack

– by 31%. Effectiveness of situational tasks' solution in defense was on the same level. The players, tested in 2016, had effectiveness of tactical thinking in defense by 60% higher (see table 4).

There is no difference between indicators of the tested groups by territorial advantage in left and right site zones. The players of 2016 were better in central zone by 54%. In group of 2006 priorities by zones were not found. Junior female handball players, tested in 2016, demonstrated higher quality of tasks' solution in central part of site: by 37% in left and by 48% in right zones (see table 5).

In tactical priorities of 2016 junior female handball players we found the following: preferences to actions in left and right zones was lower by 15%; territorial universality of attacking actions – by 10% and pre-conditions for attacks were higher in central zone by 10% (see table 6).

Sportswomen of 2016 had lower indicators of territorial universality of defense actions by 20% and defense actions with outcome – by 24%. They have higher indicators in central zone by 20% and interaction in support – by 24%. Readiness for group actions in all tested groups is equal.

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Table 2. Qualitative indicators of junior female handball players' tactical thinking

Description of indicators (quantity of correct answers)	Periods of the research	
	2006 year (n=20)	2016 year (n=18)
Situational thinking in attack	9,21±0,62	7,28±0,50*
Tactical thinking in attack	4,58±0,63	7,06±0,38*
Situational thinking in defense	6,25±0,54	3,94±0,45*
Tactical thinking in defense	3,92±0,27	5,67±0,25*

Note: *p<0.05 – comparing with indicators of 2006

Table 3. Quickness of decision taking by junior female handball players

Description of indicators	Periods of the research	
	2006 year (n=20)	2016 year (n=18)
Situational thinking in attack	3,38±0,12	3,76±0,19*
Tactical thinking in attack	3,31±0,18	4,08±0,68
Situational thinking in defense	3,85±0,16	4,31±0,17*
Tactical thinking in defense	4,36±0,17	4,11±0,18

Note: *p<0.05 – comparing with indicators of 2006

Table 4. Effectiveness of junior female handball players' tactical thinking

Description of indicators	Periods of the research	
	2006 year (n=20)	2016 year (n=18)
Situational thinking in attack	18,17±0,92	13,00±0,87*
Tactical thinking in attack	9,22±0,73	6,39±0,85*
Situational thinking in defense	10,82±0,88	11,83±0,78
Tactical thinking in defense	5,99±0,51	9,61±0,67*

Note: *p<0.05 – comparing with indicators of 2006

Table 5. Territorial priority of tactical tasks' solution by junior female handball players

Description of indicators (quantity of correct answers)	Periods of the research	
	2006 year (n=20)	2016 year (n=18)
Solution of tactical tasks in central zone	7,08±0,54	10,89±0,89*
Solution of tactical tasks in left zone	6,95±0,46	6,86±0,42
Solution of tactical tasks in right zone	6,19±0,42	5,72±0,48

Note: *p<0.05 – comparing with indicators of 2006

Table 6. Tactical priorities of junior female handball players

Description of indicators, (%)	Periods of the research	
	2006 year (n=20)	2016 year (n=18)
Bent to attacks in central zone of site	20,00	40,00
Bent to attacks in left zone of site	25,00	10,00
Bent to attacks in right zone of site	25,00	10,00
Territorial universality of attacks	30,00	20,00
Bent to defense actions in central zone of site	40,00	60,00
Bent to defense actions in left zone of site	10,00	10,00
Bent to defense actions in right zone of site	10,00	10,00
Territorial universality of defense actions	40,00	20,00
Readiness to active defense with outcome	30,00	5,56
Readiness to defense on line	10,00	10,00
Readiness for support	60,00	84,44
Bent to improvising in attacks	55,00	55,56
Tactical universality in attacks	15,00	16,67
Bent for realization of standard schemes in attacks	30,00	27,78
Bent to improvising in defense	5,00	5,56
Tactical universality in defense	80,00	16,67
Bent for realization of standard schemes in defense	15,00	77,78

and readiness for different plans of actions was on the same level. 55% of handball players plan to improvise; 30% think to act by coach's plan and 15% demonstrated universality.

In both tested groups we received the same indicators of bent to improvising in defense. Sportswomen of 2016 demonstrated higher readiness for standard actions in defense by 63% and lower bent to universality of actions by 79%.

Discussion

Results of our researches comply with high requirements to handball players' intellectual sphere, put forward by high contest of teams on international level [5]. The received data confirm the opinion [5] that in conditions of strong contest handball players shall be able to promptly perceive large volume of different signals. Our results confirm the importance of cognitive strategies for athletes [6] and show their presence in female handball players. The results, received by «Handball skills» program [13] demonstrate tactical priorities of junior female handball players on the base of tactical thinking coordination, considering physical and technical

parameters. The study of tactical thinking was fulfilled with the help of virtual board for dynamic presentation of tactical tasks [3]. Other program models with virtual board for presentation of game situation differ from method «Balltest»: slide tests [17] and video tests [41] for handball players; video tests for basketball players «BasketballTest» [1], video model for football players [18]. They imply presentation of situations in the forms of photos or video segments of real games. The mentioned program models included analysis of game situation, prediction of actions, intuition. M. Raab, S. Laborde [41] point at advantages of handball players' intuitive solutions in complex and unknown situations. V.A. Tishchenko, A.A. Shipenko [11] are sure in significant influence of players' anticipation on effectiveness of tactic actions. We think that intuition and anticipation shall be excluded from indicators of tactic thinking. Methodic «Balltest» offers stand displaying of schemes instead of real game's fragments.

Comparison of «Balltest» methodic with other programs showed their distinctions. In works of P. Weigel, M. Raab, R. Wollny [44] program model DEMATS (decision making in team sports) is presented. The

model includes device for recording visual perception of game moment. It permits to register individual speed of information's perception. «Balltest» methodic does not envisage additional devices. Sensor component of tactical thinking we determine by mean time of correct answers. A Y. Cardin, C. Bossard, C. Buche, G. Kermarrec [21] worked out virtual simulator of football ball CoPeFoot, which stipulates complex registration of decision making elements. Random selection of players does not consider emotional empathy factor that can influence on adequacy of the made decision in phases with ball. «Balltest» methodic is intended for individual testing that permits to avoid emotional empathy influence. By the data of Z. Certel, Z. Bahadir, T. Sönmez Gül [22] in female handball empathy in respect to current emotional state of other player is rather high.

The received by us data about tactical thinking confirm the data of other scientists [21, 24] about dynamic character of game situations in time aspect. Qualitative indicators of tactical thinking witness about changes in mental planning of players' actions. In 2006 and 2010 junior female handball players successfully solved situational tasks, which were based on individual-group actions with simple choice of decision (independent on game phase). In 2016 they solved more successfully the tasks in attacks, independent on complexity of game situation. Other authors [5, 9] note that attacking actions prevail over defense of high effectiveness. I. T. Gasanov [2] and V. Tsyganok [16] specify changes in tactic and positional attacks, where individual actions with quick transition dominate.

In the researches of 2016 we obtained indicators of high effectiveness of situational and tactical thinking in defense. It permits for junior female handball players to successfully solve defensive positional tasks. It is in agreement with opinion of T. Debanne, V. Angel, P. Fontayne [24] that junior athletes' coaches prefer defensive strategy of tactical training. Such strategy can reflect in athletes' mental plans. Collective game in defense with some moments of individual realization of tactic task creates difficulties for opponent [20, 24].

Study of tactical thinking sensor components showed that quickness of decision making in complex game situations does not differ in the tested groups. Junior female handball players, tested in 2016, were slow in solution of simple tasks with little quantity of players. Other data [17] show that quickness of decision making in team tasks is higher that quickness of thinking about decision. Here we can appeal to Z. Certel, Z. Bahadir, T. Sönmez Gül [22], who noted that for young athletes alert style of decision making is characteristic. This style includes carefulness and reasonability of complex situations' assessment.

For junior handball players of 2016 it was difficult to limit time for fulfillment 7 meters' throws. They had low

accuracy and great time losses. Short time for information processing by junior athletes negatively influences on actions and reduces their effectiveness [44].

Study of territorial priority in tactical tasks' solution showed that focusing on central zone is characteristic for all tested groups. But they are more expressed in 2016. These data are confirmed by the data of other researches [7, 23]. With constant players' concentration in center their actions' elements are better perceived.

In tactical priorities of junior female handball players, tested in 2016, we observed bent to successful solution of tasks in the center of site (independent on game phase). As L. Červar [23] notes dynamic game requires quickness of tactic responding. But the players' cognitive potentials [39, 44] do not permit to successfully solve the tasks in complex and badly known zones of site. N. Rogulj, V. Srhoj, L. Srhoj [43] note that limited physical or technical data of players correct their functioning. It influences on thinking stereotype [44]. In tactical priority of junior female handball players, tested in 2016, there is readiness to realize standard schemes in defense. To improvise [29] it is necessary to be ready for variable actions. It requires ability to think in space from athlete. In junior female handball players cognitive and emotional uncertainty appears due to high responsibility in defense [22]. That is why the game by standard tactical schemes permits to observe tactical plan of coach [24]. It releases pressure on decision making [29].

Conclusions

We found tactical priorities of junior female handball players in different research periods by tactical thinking indicators, considering physical potentials and throw fitness. We determined, that handball players, tested in 2016, universality in tactical preferences yield to players of 2006 and 2010. Junior female handball players, tested in 2016, have higher bent to solve tactical tasks in central zone of site in attack and defense as well as to solve tactical tasks of positional defense. They also are ready to act on support. In junior female handball players of 2006 and 2010 we observed abilities for successful solution of tactical tasks, which do not depend on site zone. They are ready: to defend with outcome and on support; to improvise in attack.

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Conflict of interests

The authors declare that there is no conflict of interests.

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