

Psycho-physiological characteristics of female basketball players with hearing problems as the basis for the technical tactic training methodic in world level teams

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Abstract:

Purpose: to work out and experimentally prove methodic of technical tactic training for elite female basketball players with hearing problems, considering their psycho-physiological characteristics. *Material:* in the research sportswomen of Ukrainian female combined basketball team with hearing problems (n=12) and healthy sportswomen (n=12) participated. Both teams participated in basketball championship of Ukraine. Age of sportswomen was 25–30 years. *Results:* it was found that female basketball players with hearing problems had confidently less latent period of simple and complex reactions to light irritator in comparison with healthy sportswomen. By results of tapping test basketball players with hearing problems showed higher frequency of movements than the healthy ones. We worked out methodic of technical-tactic training for female basketball players with hearing problems. When mastering tactic interactions, demonstrativeness method was accentuated. The authors' video-aid with animation illustrations has been presented. For control of training process of female basketball players with hearing problems we used LED lighters. *Conclusions:* psycho-physiological characteristics of female basketball players with hearing problems are higher results in tests, which require activity of visual analyzer and standard movements.

Key words: basketball, hearing, disorders, psycho-physiological potentials, light, illustration, animation.

Introduction

At modern stage of world society elite sports is an integral part of life activity of any country. Sports impacts way of people's life, dictates fashion, influences on national relations, social position, ethic values. Of special importance sports practicing is for people with different problems in physical condition. For person with physical problems sports help to cultivate confidence in own potentials and forces. Disabled sportsmen defend interests of their countries at the largest international competitions. That is why working out of technologies for training of disabled sportsmen is of special importance. Such approaches shall, on the one hand, coincide with technologies of healthy sportsmen's training and, on the other hand, differ.

As on to day, there has been a number of scientific researches, in which problems of training and competition functioning of healthy sportsmen are regarded (Aziz, Chia, Singh, & Wahid 2011; Adashevskiy et al. 2014; Podrigalo, Iermakov, NoskoGalashko, & Galashko, 2015; Iermakov, Arziutov, & Jagiełło, 2016). In a number of works (Bogdanis, Bogdanis, Ziagos, Anastasiadis, & Maridaki, 2007; Ringuet–Riot, Hahn, & James, 2013; Singh & Agashe, 2015) content of physical and psychological training as well as structure of female basketball players' fitness were studied. In other works, devoted to basketball players' technical tactic training, training programs for increase of sportsmanship are offered (Muller, 2007; Bogdanis et al. 2007; Barybina, Kozina, Tikhenko, & Tolstobrov, 2009; Martínez & Tindale, 2015; Kozina, Repko, Ionova, Boychuk, & Korobeinik, 2016).

Some authors offer to use non traditional rehabilitation means for restoration of sportsmen's functional state (Aziz et al., 2012; Kudryavtsev, Kramida, & Iermakov, 2016; Zhanneta, Irina, Tatyana, Olena, Olena, & Anna, 2015). Other authors determined physical and functional reasons of traumatism and effectiveness of complex methodic application for female basketball players' rehabilitation after traumas (Kopylov et al., 2015; Namdari, Scott, Milby, Baldwin, & Lee, 2011) and basketball players (Zheleznyj, Zasik, & Mukhin, 2013).

Kozina (2015) worked out theoretical conception of training process individualization in sports. The conception implies marking out of leading factors in individual structure of sportsmen's fitness. They developed also algorithm of sportsmen distribution into groups for formation of tactic tasks in game team kinds of sports with the help of multi-dimensional analysis. One more aspect of this conception is analysis of regularities and prognosis of competition efficiency's individual dynamic. This conception can be used both for healthy and disabled sportsmen (Barybina et al. 2009). The offered by the authors approach to sportsmen distribution into groups is confirmed by other works (Mukherjee & Chi, 2013; Ivashchenko et al., 2015a, 2015b).

In other research potential game roles of sportswomen and fitness structure of players were specified. The authors used hierarchic cluster analysis of physical, physiological and psycho-physiological testing indicators (Kopeikina, Drogomeretsky, Kondakov, Kovaleva, & Iermakov, 2016). It was shown that sportswomen's individual characteristics and their game roles are not connected exclusively with anthropometrical indicators. They also depend on a number of other physiological and psycho-physiological characteristics. Such indicators confidently differ in players of different game roles. This conception is acceptable also for sportsmen with hearing problems.

In other work (Kozina, Sobko, Kolomic, Jagiełło, & Jagiełło, 2014) realization of individualization approach in team of basketball players with hearing problem was described. Pedagogic tests, functional tests, bio-chemical and psycho-physiological indicators for determination of general and individual fitness structure were realized. With the help of hierarchic cluster analysis the authors offered formation of sportswomen groups for individual work. On the base of individual factorial values and cluster analysis sportswomen's individual characteristics and individual training programs were composed. Correctness of such approach is confirmed also by other works (Khudolii, Iermakov, & Prusik, 2015; Ivashchenko, Yermakova, Cieslicka, & Muszkieta, 2015).

In the mentioned works the role of psycho-physiological functions in formation of sports functioning individual style is accentuated. It is expressed in bent to definite game role and style of duel in martial arts (Arziutov, Iermakov, Bartik, Nosko, & Cynarski, 2016; Bliznevsky, Kudryavtsev, Iermakov, & Jagiełło, 2016; Iermakov, Podrigalo, & Jagiełło, 2016; Kozina, Iermakov, Kuzmin, Kudryavtsev, & Galimov, 2016; Podrigalo, Iermakov, Alekseev, & Rovnaya, 2016;) in preferred kind of activity (Gaskov, Kuzmin, Kudryavtsev, & Iermakov, 2016; Khudolii, Iermakov, & Ananchenko, 2015; Podrigalo, Iermakov, Galashko, Galashko, & Dzhym, 2015). Such approach coincides with the data of other authors (Makarenko, Lizogub, & Lukhimenko, 2006; Korobeynikov, Mazmanian, Korobeynikova, & Jagiello, 2011; Kozina et al., 2016a, 2016b) about important role of psycho-physiological indicators in formation of motor functioning individual structure.

In other work (Illytska et al., 2016) cluster analysis of psycho-physiological and physiological indicators in combination with analysis of sportsmen's subjective feelings was fulfilled. The authors showed determining role of psycho-physiological potentials in reacting to extreme situation.

That is why it was logical to assume that people with prevailing activity of one of analyzers will have psychological potentials, differing from average statistical standards. That means that sportsmen with hearing problems shall compensate deficit of audio information with increased activity of visual analyzer. It is proved by empiric observations over disabled people, which witness about stronger hearing and tactile feelings on blind people.

In sports for disabled much attention is paid to sportsmen with problems of muscular-skeletal apparatus, who play basketball on wheelchairs (Kozina & Iermakov, 2015; Gómez, Pérez, Molik, Szyman, & Sampaio, 2014; Mutsuzaki et al. 2014). Other researches are directed on development of coordination in case of muscular skeleton disorders (Pomeshchikova et al., 2016a, 2016b). Among other works we can mention the researches oriented on health improvement of youth with hearing problems. The authors accentuate attention on demand in formation of body vertical balance (Razumeiko, 2015; Storozhik et al., 2015; Nosko, Razumeiko, Iermakov, & Yermakova, 2016) development of psycho-motor function (Ivahnenko, 2014; Khudolii, Ivashchenko, Iermakov, & Rumba, 2016; Korobeynikov, Korobeynikova, Iermakov, & Nosko, 2016), increase of motivation for training (Ivashchenko, 2016; Ivashchenko et al., 2016; Pryimakov, Iermakov, Kolenkov, Samokish, & Juchno, 2016). However, nowadays there is deficit of special researches on determination of psycho-physiological characteristics of sportsmen with hearing problems.

It should be noted that in our works we showed specific features of technical and physical fitness (Sobko, 2013; Kozina, Sobko, Klimenko, & Sak, 2013; Kozina, 2015) and competition functioning of female basketball players with hearing problems (Sobko, 2013). Besides, we offered ways for increasing of training process effectiveness for female basketball players with hearing problems (Sobko, 2013, 2014, 2015). Results of our and other researches point that during recent years, among the strongest sportsmen with hearing problems in the world the density of results has significantly increased and contest has become more acute (Kurková, Válková, & Scheetz, 2011; Sobko et al., 2014). That is why studies, oriented on increase of results and creation of sports training means and methods for female basketball players with hearing problems are still important (Sobko et al., 2014; Pysanko, 2016).

Information about sportsmen with hearing problems training witness that in their training commonly accepted methodic approaches, used for healthy sportsmen, are applied. Harris (2008) found that for technical

training of sportsmen with hearing problems principle of exercise's mastering from simple to complex with multiple repetitions is used. In other work (Graib, Qablan, & Aldmour, 2012) analysis of some personality features' influence on efficiency factor of basketball players with hearing problems was carried out.

In our research (Sobko et al., 2014) we determined low level of physical fitness of weakly hearing sportswomen, comparing with healthy basketball players. It is connected with physiological interconnection between different analyzers – hearing, vestibular and motor. Comparative research of competition functioning indicators of healthy female basketball players and sportswomen with hearing problems showed low intensity of weakly hearing sportswomen's play; caution and uncertainty in attacks (sportswomen avoided close contacts and collisions with backs); multiple ball losses and mistakes from uncoordinated technical-tactic actions in game. Basing on it, we can conclude that absence of hearing hinders sportswomen's mutual understanding during long-term rallies with the help of multi-way combinations.

That is why we put forward the *hypothesis*: for increase of group and team female basketball players with hearing problems interactions' coordination it is necessary to work out special methodic. Such methodic shall be based on psycho-physiological characteristics of sportswomen. The methodic shall contain visual aids, dynamic technical-tactic video-schemas. For realization of this task it is necessary to study psycho-physiological characteristics of female basketball players with hearing problems and their comparison with healthy basketball players' indicators.

The purpose of the research: to work out and experimentally prove methodic of technical-tactic training of elite female basketball players with hearing problems, considering their psycho-physiological features.

Material and methods

In the research sportswomen of Ukrainian female combined basketball team with hearing problems (n=12) and healthy sportswomen (n=12) participated. Both teams participated in basketball championship of Ukraine. Age of sportswomen was 25–30 years. According to rules of Ukrainian basketball championship teams of female basketball players with hearing problems can participate in it. In case of basketball players' with hearing problems participation third field referee is invited. It permits for female basketball players with hearing problems to keep in sight one of referees all time and observe referees' gestures. Such organization of championships permits for female basketball players with hearing problems to compete with healthy basketball players. For comparison, we involved team of healthy female basketball players equal by rating in the research. The team of female basketball players with hearing problems was combined team of Ukraine. It was also a participant of international championships (championships of Europe and World, Deaflympic games). In both teams equal testes were used.

Psycho-physiological testing was realized with the help of complex "Sports psycho-physiologist" (Russia). This methodic has some analogs, presented in earlier researches (Ciuffreda & Goldrich, 1983; Schoenberg, Sierra, & David, 2012). The complex consists of hardware and software. Hardware consists of panel with sensors and LEDs; device for testing (visual sensor system in the form of tube with LEDs); earphones and pedal "ON-OFF". Software is a specialized computer program. The complex includes 20 psycho-physiological and 18 personality's psychological tests. All methodic were verified in standard way. The purpose of the complex is study of sportsmen's psycho-physiological characteristics, psycho-motor abilities and psychological features of their personalities. Distinctive feature of this complex is definite set of tests, permitting to complexly assess important for sports functioning psycho-physiological characteristics. This complex also permits to assess psycho-motor abilities manifested in reaction to pressing of button by hand and pedal with foot.

Among psycho-physiological indicators we registered time of simple and complex reactions in different conditions of test's fulfillment. Testing was conducted in the following way: with one eye the tested looks through tube, in which light signal is displayed on special screen. In direct testing the tested with the same, in respect to looking eye, hand shall press button, when signal appears. When doing this test for legs, the pedal shall be pressed by the same foot. In cross testing the tested does the same procedure by different, in respect to looking eye, hand or foot. In the same way we measured direct and cross reaction of choice.

For determination of psycho-physiological potentials we used the following tests:

- cross simple sensor-motor reaction to signal:
 - 1 – Left eye and button pressing by right hand;
 - 2 – Right eye and button pressing by left hand;
- cross simple sensor-motor reaction to signal:
 - 3 – Left eye and button pressing by right hand;
 - 4 – Right eye and button pressing by left hand;
 - 5 – Left eye and button pressing by right foot;
 - 6 – Right eye and button pressing by left foot;
- direct simple sensor-motor reaction to signal:
 - 7 – Right eye and button pressing by right hand;
 - 8 – Left eye and button pressing by left hand;

- simple cross sensor-motor reaction to signal:
 - 9 – Left eye and pedal pressing by right foot;
 - 10 – Right eye and pedal pressing by left foot;
- direct simple sensor-motor reaction to signal:
 - 11 – Right eye and button pressing by right hand;
 - 12 – Left eye and button pressing by left hand;
 - 13 –right eye and pedal pressing by right foot;
 - 14 – Left eye and pedal pressing by left foot;
- cross sensor-motor reaction of choice to signal:
 - 15 –left eye and pedal pressing by right foot;
 - 16 –left eye and pedal pressing by left foot;
- tapping test, with fulfillment of which the tested pressed button maximally quickly during one minute:
 - Button: 17 – by right hand; 18 – by left hand;
 - Pedal: 19 – by right foot; 20 – by left foot.

The procedure of tapping test implied the following: sportsmen pressed button or pedal by hand or by foot as quick as possible during one minute (60 seconds). Frequency of pressings was registered every 10 seconds. Thus, during one minute 6 measurements were fulfilled (I, II, III, IV, V, VI stages). Every stage lasted 1-seconds. The purpose of this test is to diagnose frequency of movements and tiredness of nervous system.

The team of female basketball players with hearing problems was trained by the offered by us methodic during 10 months before Deaflympic games (2013, Sophia, Bulgaria).

Statistical analysis

Numerical material of the research was processed with the help of traditional methods of mathematical statistics. For every indicator we determined mean arithmetic \bar{X} , mean square deviation S (standard deviation), confidence of differences between indicators of healthy female basketball players and sportswomen with hearing problems by Student's t-criterion (with appropriate significance level – p). The received data were processed with the help of Microsoft Excel, SPSS programs. Differences were considered confident with significance level of $p < 0.05$.

Results

It was found that female basketball players with hearing problems had confidently less latent period of simple (by 115.5 msec, $p < 0.05$), and complex (by 95.1 msec., $p < 0.05$) reactions to light irritator in comparison with healthy sportswomen (see fig.1). We also found that female basketball players with hearing problems demonstrated higher frequency of movements in tapping test and less expressed reduction of movements' frequency in long-term tapping test. The following indicators of female basketball players with hearing problems in tapping test, comparing with healthy sportswomen:

- Right hand test: at II stage by 17 pressings more ($p < 0.05$), at V stage – by 26 pressings more ($p < 0.001$);
- Left hand test: at II stage by 18 pressings more ($p < 0.05$), at V stage – by 27 pressings more ($p < 0.001$);
- Left foot test: at II stage by 19 pressings more ($p < 0.05$), at V stage – by 17 pressings more ($p < 0.05$) (see fig. 2).

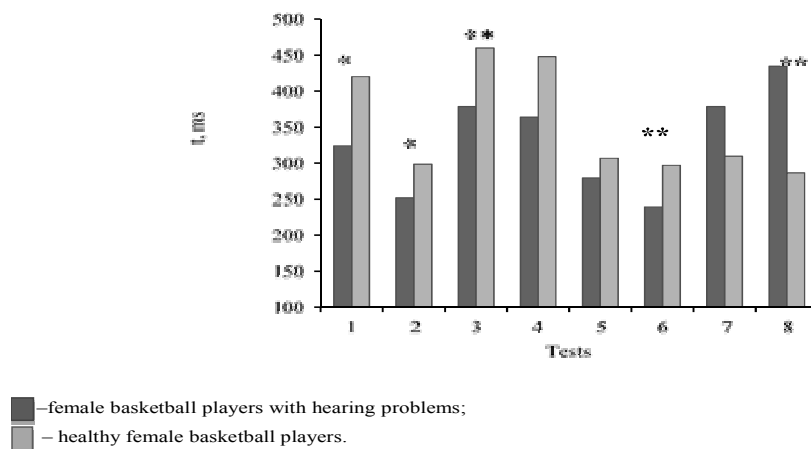


Fig.1. Indicators of psycho-physiological tests of female basketball players with hearing problems ($n=12$) and healthy sportswomen ($n=12$): t – reaction time, msec.; * – differences are confident at $p < 0.05$; ** – differences are confident at $p < 0.001$;

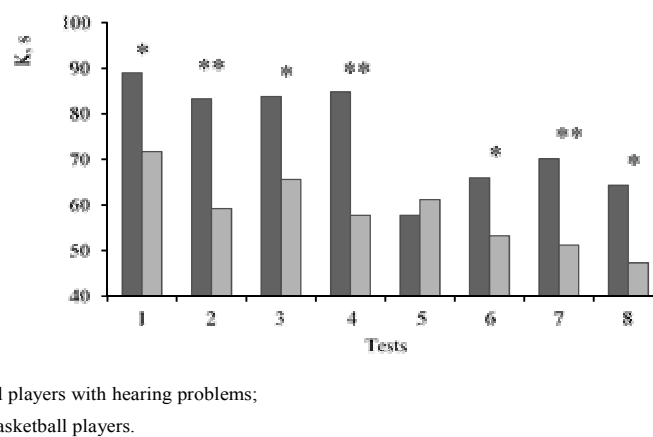


Fig.2. Indicators of tapping test of female basketball players with hearing problems (n=12) and healthy sportswomen (n=12): K – quantity of pressings during 10 sec; 1 – right hand (II stage); 2 – right hand (V stage); 3 – left hand (II stage); 4 – left hand (V stage); 5 – right foot (II stage); 6 – right foot (V stage); 7 – left foot (II stage); 8 – left foot (V stage); * – differences are confident at $p < 0.05$; ** – differences are confident at $p < 0.001$;

The found differences are connected with compensatory mechanisms of hearing analyzer's functioning deficit at the account of increasing of visual analyzer's activity. Basing on these principles we can conclude that implementation of additional visual information in training process of female basketball players with hearing problem will facilitate perfection of technical and tactic skillfulness. On the base of the received data we worked out methodic of technical tactic training for female basketball players with hearing problems (see fig.3). Results of our previous researches (Sobko et al., 2014; Sobko, 2015) were put in foundation of this methodic.

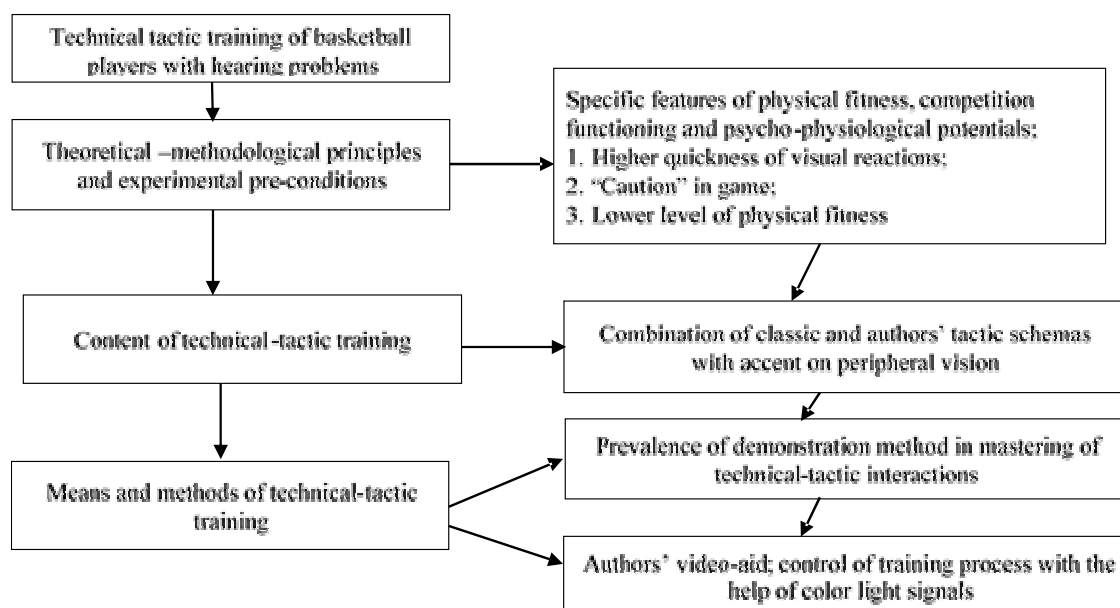


Fig.3. Methodic of technical tactic training for female basketball players with hearing problems on the base of their psycho-physiological characteristics.

We received experimental data about specific features of physical fitness, competition functioning and psycho-physiological potentials of sportswomen.

This methodic includes two main authors' technologies:

1 – application of LED linear lighter for control over training process of female basketball players with hearing problems;

2 – application of authors' video-aid with animation illustrations.

The first component was method of control over training process. In this case coach's commands are given with the help of lighters' signals, which are located out of site. Lighters are controlled with the help of control block on panel. Depending on color of lighter female basketball players fulfill one or another command. For example in perfection of ball pass on the spot:

- Red color is a signal for ball pass at 5–6 meters' distance with one hand;
- Blue color is a signal for pass by two hands from breast at distance of 3–4 meters;
- Green color is a signal for pass at short distance (2.5 – 3 meters) in jump.

Ball throws were fulfilled in series, depending on lighter's color (red – throws from 3 scores' line; blue – throws from average distance; green – throws from close distance). Besides, color signal was used for perfection of group and team interactions. With the help of color every player fulfilled appropriate combination or interaction. Such method of control over trainings implies both: control with any single color and with combination of colors.

Coach, in his work, has opportunity to control correctness of his commands fulfillment by separate sportswomen; to make remarks and instructions. Owing to this method we managed to reduce to minimum duration of breaks in motor functioning in training session for receiving of coaches instructions.

As it is known (Moanță, Tudor, & Ghițescu, 2013; Sampaio, Gonçalves, Rentero, Abrantes, & Leite, 2014) perfection of attacks is realized as a result of constant training of correct interactions. First it is realized in small groups; then in the whole team. Analysis of situation, speed and masking of actions are important factors of attack system's effectiveness.

Due to their specific deviations, it is difficult for female basketball players with hearing problems to master new tactic combinations. That is why for such sportswomen it is very important to see and learn all elements (movements) and different variants of combination's finalizing. They can not orally inform partner about demand in block in the process of game. They have no possibility to give commands about change of tactic actions, caused by sudden change of situation at site. Therefore, female basketball players shall know exact positions of players. Have clear ideas of logical development of situation, depending on existing competition conditions. In this connection the second component of our methodic was application of authors' video-aid on tactic of game with animation illustrations. For creation of animation we used program Macromedia Flash MX2004. Film was built on theoretical information about basketball tactic; on review of existing tactic combinations. Central part of the film contains authors' animation video-clips on definite tactic schemas of attacks and defense. Thus, we visualized classic tactic interactions in basketball and authors' (worked out especially for the given team together with coach). Distinction of our video-aid from other ones is that tactic schema is perceived as something holistic with simultaneous movements of all players (see fig.2).

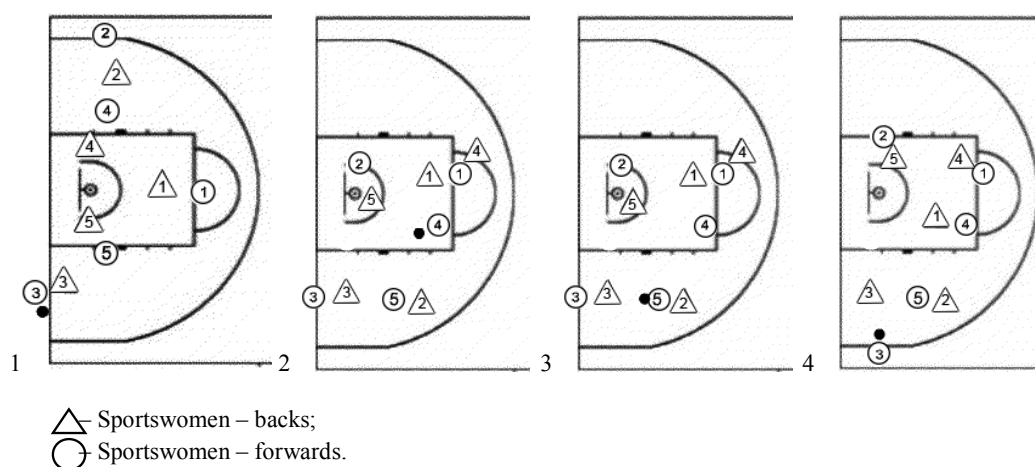


Fig.4. Images from authors' video-aid with animation illustrations; illustration of tactic interaction "Throw-in":
1,2,3,4 – film images for illustration of actions' sequence in tactic combination.

Every sportswoman was presented with all new, already studied animation tactic illustrations. Coach gave explanations of every combination and set exact tasks, depending on game role of sportswomen. At every training session coach demonstrated video film, analyzed definite interactions and gave tactic tasks for current training. Thus, in our methodic of technical-tactic training the authors' system of "sportswomen-coach" communication is used. Such communication system permitted to increase intensity of training process. Application of the worked out methodic permitted also to increase physical and technical fitness and effectiveness of female basketball players' with hearing problems technical-tactic actions. It gave the following positive result: the team took 2nd place at 22nd Deaflympic games. This achievement is the highest for the combined team of Ukraine for all period of its existence (International Committee of Sports for the Deaf, 2013).

Discussion

The fulfilled research showed correctness of our hypothesis about presence of psychological specific characteristics in female basketball players with hearing problems, comparing with healthy sportswomen. The results show at demand in basing on psycho-physiological characteristics of female basketball players with

hearing problems, when working out training process technology. This principle is of special importance for teams of world level.

In our research we determined that female basketball players with hearing problems have confidently less latent period of simple and complex reactions to light irritator, comparing with healthy sportswomen. This peculiarity can be explained by compensatory function of visual analyzer in connection with absence of hearing analyzer's work. Accordingly, female basketball players with hearing problems have better psycho-motor processes, connected with participation of only visual analyzer. Compensation of one analyzers' deficit by other is a regular physiological phenomenon. This phenomenon was experimentally proved in our researches. Many other scientists also pointed at possibility of compensation of one analyzers' deficit by intense development of other; as well as it was proved by facts of empiric observations of many authors (Khidr,2010; Jennifer, Rebecca, & Michael, 2012; Dursun et al., 2015).

For example, Adler (1997) pointed that specially organized education helps disabled people to compensate deficit of analyzers' operation. The author explains this by the fact that human organism is able to compensate some defect by other organ of senses. If a person can not use hearing organs, he (she) has to use eyesight, tactile and other organs of senses in uncommon for them functions. With hearing problems person can use visual or tactile perception of speech. The author notes that possibilities of one organs' replacement with other are rather restricted. In such cases reserves of inter analyzing compensation are insufficient for scientists to scientifically substantiate some facts of advanced achievement of some people, who have some physical defects. It permits to conclude that compensation shall be regarded as manifestation of human intellectual-volitional functions at high level.

The facts of outstanding intellectual achievements of people with physical defects are rather impressive. Thus, the received data about compensation of hearing analyzer's deficit by strengthened functioning of visual analyzer coincide with empiric facts of other authors (Kurková et al., 2011; Karademir, 2012).

In some cases one can observe increase of emotional sensitivity and intellect. This fact rejects opinion of many coaches about weaker cognitive abilities of deaf sportswomen in comparison with healthy ones. It points at presence of some peculiarities in psycho-physiological processes, connected with higher activity of visual analyzer as compensatory mechanism. Such peculiarities shall be considered as a coach when working with team of female basketball players with hearing problems. In such case, coach shall maximally use different visual aids. They can be dynamic technical-tactic schemas, systems of color signals, video-analysis and other.

It should be noted that the received experimental data about compensation of deficit of hearing analyzer's functioning by enforced development of visual analyzer in female basketball players' with hearing problems are not sporadic in our research. We also obtained the data that weakly hearing basketball players had higher movements' frequency by indicators of tapping test and less expressed reduction of movements' frequency in long fulfillment of tapping test. Female basketball players also have confidently higher tapping test results, comparing with healthy basketball players. It can be explained by quicker efferent synthesis, which is compensatory mechanism of slowed afferent synthesis in connection with disorder of hearing analyzer.

The received fact coincides with main principles of systemic approach (Anohin, 1978). The author points that in research work analytical study of some partial object is impossible without exact identification of this part in large system. Such approach is based on the fact that conception about constancy of organism's inner medium is a key adaptation mechanism. Bernard (1957) thought that homeostasis is the main condition of organism's existence. It implied also such perfection of organism that external changes would compensate and balance every moment.

Coming from received higher indicators of tapping test of weakly hearing sportswomen, comparing with healthy ones, it would be logical to accent on principles of compensation in theory of functional systems Anohin (1978). Theory of functional systems, as it is, was developed by the author as a result of conducted by him researches of compensatory adaptations to disordered organism's functions. Any compensation of disordered functions can take place only under mobilization of numerous physiological components, which are often located in different parts of nervous system and working periphery. Nevertheless, they are always functionally combined on the base of receiving of final adaptation effect.

Basing on he mentioned concepts the fact of higher tapping test results in weakly hearing female basketball players becomes rather explainable: deficit of afferent synthesis (i.e. signals coming to brain from external medium) is compensated by strengthened efferent synthesis (i.e. signals, coming from central nervous system, caused by movements of hand or foot, when fulfilling tapping test).

In modern basketball it is especially important for sportswomen to quickly take effective decision in any game situation. Basketball players shall be able to quickly select purposeful game technique and fulfill it rationally, considering time, space and muscular efforts. After it sportswomen shall manage to control result of own actions (McInnes, Carlson, Jones, & Mckenna, 1995; Muller, 2007). For female basketball players with hearing problems this task is still more difficult due to their specific peculiarities. In opinion of advanced specialists competition functioning of elite female basketball players goes in extreme conditions and is

connected with high psychic tension. That is why it is especially important to consider psycho-physiological potentials of sportswomen (Martin, 1999; Carter, Ackland, Kerr, & Stapff, 2005).

For sportsmen perception and processing of visual information is one of important properties of neuro-psycho-physiological functions. Quickness of visual reaction depends on a number of factors, which condition effectiveness of sportsman's functioning: afferent, receptive component of information perception; central component, processing of visual information at level of central nervous system; efferent, executive component of neuro-psycho-physiological reacting. That is why for controlling of a team coach shall understand peculiarities of perception and specificities of thinking of female basketball players with hearing problems.

It should be noted that in sports different computer systems and programs are used for rising training quality (to motor techniques, to tactic skillfulness and for acquiring of theoretical knowledge). Such approach permits to realize in practice one of main training methods – method of vivid perception. Such approach is proved in several works (Romeas, Guldner, & Faubert, 2016; Hohmann, Obelöer, Schlapkohl, & Raab, 2016). For example with the help of special programs in sportsmen-beginners ideas about high quality fulfillment of every exercise are formed. Besides, situations are simulated, which shall be solved in most rational way (Moistsrapishvili, Egoyan, & Mirtskhulava, 2005). The authors present theoretical material and special test tasks, usage of which permits to assess the level of this material mastering.

Thus, our research has supplemented the data (Ross & Sharpless, 1999; Ringuet–Riot et al., 2013) about demand in innovative methodic, connected with usage of technical devices, multi-media aids, informational technologies in sports. Modern informational-communication methodic permit to organize and activate sportsmen's with health problems independent and scheduled work. Application of special training and developing programs very expands opportunities for training and perfection of training and competition processes.

The received data can be applied in training of sportsmen with hearing problems in game kinds of sports. The methodic of technical-tactic training can be used by caches, who work with children, who have hearing problems.

Conclusions

1. As a result of psycho-physiological testing of healthy sportswomen and those with hearing problems we found that female basketball players with hearing problems have better psycho-motor processes with participation of only visual analyzer. By results of tapping test female basketball players with hearing problems have higher movements' frequency, comparing with healthy sportswomen.

2. We have worked out methodic of technical-tactic training for elite female basketball players with hearing problems, which includes: multi-media aids with dynamic illustration of tactic interactions; light technologies for control over team during training session.

3. We have shown effectiveness of application of the offered methodic for training of Ukrainian combined team of female basketball players with hearing problems to Deaflympic games (2013).

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