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DEVELOPMENT OF MOVEMENT COORDINATION AMONG HANDBALLISTS AT THE INITIAL PREPARATION STAGE

The article highlights the results of a study on the effectiveness of the experimental methodology for the development of the coordination qualities of handball players 10-11 years old. The participants in the experiment were 40 young men training in primary training groups, from which the experimental group (EG, $n=20$) and the control group (CG, $n=20$) were formed. The level of development of coordination qualities was assessed using tests: shuttle run 4x9m, snake run with 2x9m dribbling, throwing a handball on the target, passing the ball in pairs. It was revealed that the use of exercises with balls in the preparatory and final parts of a training session, complexes of exercises aimed at improving the work of exteroceptive analyzers, developing the ability to coordinate and combine movements, to differentiate spatial and power parameters of movements, and the ability to quickly respond to changing game conditions contributed to a statistically significant increase in coordination development indicators. According to the results of the «4x9m shuttle run» test, an improvement was found in the EG by 13.44% and in the CG by 7.64% ($p<0.0001$), in the test «snake run with 2x9m dribbling» - by 9.28% in the EG and by 6.45% ($p<0.0001$) in the CG. According to the results of the test «throwing a handball on the target» in the EG by 40.81% ($p<0.0001$), and in the CG only 11.09% ($p>0.05$). According to the results of the test «passing the ball in pairs», the performance of athletes in the EG improved by 13.13% ($p<0.0001$) and in the CG only 10.87% ($p>0.05$). The positive dynamics of the level of coordination indicators demonstrates the effectiveness of the proposed method.

Keywords: handball players of 10-11 years; sports training; exercises for coordination focus; dribbling.

Розвиток координації рухів у гандболістів на початковому етапі підготовки. Високий рівень координації у гандболістів необхідний для оптимальної, успішної змагальної діяльності. У статті висвітлюються результати дослідження, присвяченого виявленню ефективності експериментальної методики розвитку координаційних якостей гандболістів 10-11 років. Учасниками експерименту були 40 юнаків, що тренуються в групах початкової підготовки, з числа яких було сформовано експериментальну (ЕГ, $n=20$) та контрольну групи (КГ, $n=20$). Рівень розвитку координаційних якостей оцінювали, використовуючи тести: човниковий біг 4x9 м, біг «змійкою» з веденням м'яча 2x9 м, метання гандбольного м'яча по мішені, передача м'яча у парах. Виявлено, що застосування вправ з м'ячами, в підготовчій і заключній частинах тренувального заняття та комплексів вправ, спрямованих на поліпшення роботи екстероцептивних аналізаторів, на розвиток здатності до узгодження і комбінування рухів, до диференціювання просторових і силових параметрів рухів, здатності до швидкого реагування на мінливі умови гри, сприяло статистично достовірному приросту показників розвитку координації. Позитивна динаміка показників рівня розвитку координації свідчить про ефективність запропонованої методики.

Ключові слова: гандболісти 10-11 років; спортивне тренування; вправи координаційної спрямованості; ведення м'яча

Чухланцева Н. В. Развитие координации движений у гандболистов на начальном этапе подготовки. Высокий уровень координации у гандболистов необходим для оптимальной, успешной соревновательной деятельности. В статье освещаются результаты исследования, посвященного выявлению эффективности экспериментальной методики развития координационных качеств гандболистов 10-11 лет. Участниками эксперимента были 40 юношей, тренирующихся в группах начальной подготовки, из числа которых было сформировано экспериментальную (ЭГ, $n=20$) и контрольную группы (КГ, $n=20$). Уровень развития координационных качеств оценивали, используя тесты: челночный бег 4x9м, бег «змейкой» с ведением мяча 2x9 м, метание гандбольного мяча по мишени, передача мяча в парах. Выявлено, что применение упражнений с мячами, в подготовительной и заключительной частях тренировочного занятия, комплексов упражнений, направленных на улучшение работы экстероцептивных анализаторов, развитие способности к согласованию и комбинированию движений, к дифференцированию пространственных и силовых параметров движений, способности к быстрому реагированию на изменяющиеся условия игры способствовало статистически достоверному приросту показателей развития координации. Положительная динамика показателей уровня развития координации свидетельствует об эффективности предложенной методики.

Ключевые слова: гандболисты 10-11 лет; спортивная тренировка; упражнения координационной направленности; ведение мяча.

Problem statement. Modern handball is one of the most spectacular and dynamic game sports, with a large range and richness of movement performed in various game situations of a competitive nature, therefore, requires more effective training aimed at comprehensive physical development of young athletes. The level of training for novice handball players must meet the increasing requirements for physical and technical and tactical fitness, and the training system for handball players must fully meet the growing need for successful players. The high level of development of overall coordination of movements is directly related to competitive performance, in particular the coordination skills of handball players determine the characteristics of the ball throw, jumping (throwing a ball in a jump, with one or two legs, with or without running) and specific agility. The choice of methods of development of

coordination skills of young handball players depends directly on the technical and tactical features of the game, on the sequence of learning the techniques of the game.

Analysis of literary sources. Many researchers have been developing new and improving the existing methods of physical, technical, psychophysical training of handball players [1, 5, 8]. However, analysis of the scientific and methodological literature shows that the problem of improving coordination skills, using the most effective means, for handball players of 10-11 years requires comprehensive consideration. It is known that although coordination skills are genetically determined, it is advisable to develop them in the training process [7]. It is especially important to take into account the age characteristics and skill level of beginning athletes, sensitive periods of this process. The ability to quickly change direction and respond to various stimuli is a particularly important requirement in handball [2, 11]. During the study of various anthropometric, physical, psychophysiological characteristics of elite and sub-elite handball players, it was found that the level of development of coordinating qualities is the most limiting factor, and the ability of handball players to perform various nimble and fast actions, quickly start movement and stop it, influence their efficiency [1, 3]. Previous studies have shown that coordination skills can be effectively enhanced by players using traditional means and methods, including exercises similar to the technical and tactical actions of an athlete, which are performed not only in a stable state, but also in a state of latent and explicit physical and mental fatigue or performance of complicated movements of players, alternation of game functions when playing in the attack and others [6]. However, there is limited attention to the development of coordination among novice players. The development of coordination capabilities that ensure future athletic performance should be directed to the acquisition of new, diverse motor skills and their components, and the methods and training used should be consistent with the overall level of development of the athlete. It is noted that the method of purposeful development of coordination among young players differs from the method of training for adults because of the peculiarities of adulthood [9, 10]. Given that young athletes have different rates of physical development and the pace of development of technical skills, the means and methods should ensure the gradual development of specific coordination qualities, taking into account the growth of physical and psychophysical abilities of beginners.

Purpose of the article (statement of tasks). The purpose of the study was to experimentally test the effectiveness of the developed methodology for the development of special coordination qualities of young handball players at the initial stage of training. In terms of long-term sports training, the goal was to create a basis for the complex motor activity of athletes, that is, accurate, error-free motor actions. The objectives of the study were to: analyze and summarize data from literary sources on the development of coordination skills among handball youths; to develop and test the effectiveness of the improved method of development of coordination qualities among handball players of 10-11 years.

Outline of the main research material. The participants of the experiment were 40 young handball players (10-11 years old), trained in the initial training groups of the school youth, which were randomly divided into two groups: the experimental group (EG, n=20) and the control group (CG, n=20). Both groups trained 4 times a week for 90 minutes. The basis of the program that we used for EG athletes was part of the current program for youth sports in handball [4]. The difference between the proposed experimental program was the implementation of practice sets of exercises for the development of coordination skills, which were applied 4 times a week at the beginning of the main part of the class. In addition, unlike the CG athletes, the EG athletes performed all exercises in the preparatory and final part of the ball training session. The experimental program was implemented during the school year. The level of development of coordination skills was evaluated using the tests: shuttle run 4x9m (s), snake run with 2x9m dribbling (s), throwing a handball at the target (number of hits), passing the ball in pairs (quantity) [4]. All statistical analyses were carried out with STATISTICA version 22.00 software (StatSoft Inc., Tulsa, OK, USA). All data were presented as mean \pm standard deviation of the Mean (SD). Differences were considered to be reliable at a significance level of $p < 0.05$.

Comparison of the test results of the athletes of the experimental and control groups at the beginning of the experiment determined their identity for all tests ($p > 0.05$), which indicates the homogeneity of the groups. The test results are presented in Table 1.

Table 1.

Indicators of level of development of coordination qualities of young handball players of experimental (n=20) and control (n=20) groups at the beginning and at the end of the study. Data are presented as the mean (\pm SD).

Measurable indicators	Groups	Pre-test	Post-test	p-value
Shuttle run 4x9 m (s)	EG	10.56 \pm 0,11	9.14 \pm 0,05	<0.0001
	CG	10.34 \pm 0,12	9.55 \pm 0,1	<0.0001
	p-value	0.18	0.0008	
Snake run with 2x9 m dribbling (s)	EG	9.94 \pm 0.1	9.02 \pm 0.08	<0.0001
	CG	9.92 \pm 0.08	9.28 \pm 0.12	<0.0001
	p-value	0.88	0.08	
Throwing a handball at the target (number of hits)	EG	12.25 \pm 0.45	17.37 \pm 0.38	<0.00001
	CG	11.55 \pm 0.58	12.83 \pm 0.44	0.13
	p-value	0.35	0.00001	
Passing the ball in pairs (quantity)	EG	21.7 \pm 1.42	30.56 \pm 0.79	<0.00001
	CG	22.15 \pm 1.67	24.61 \pm 0.55	0.17
	p-value	0.21	0.00001	

Note. CG: control group; EG: experimental group; M = mean; SD = standard deviation; P-value = statistical significance at the 95% CI (values in bold indicate a significant difference).

The importance of a high level of coordination qualities for players of team sports is undeniable. Coordination skills play an important role in handball training. Not only are they crucial in the development, acquisition and improvement of basic technical skills, but they also determine the player's performance and performance during the game. The proposed sets of exercises were aimed at developing the ability to orient in space, the ability to coordinate and combine movements, to differentiate the spatial and power parameters of motion, the ability to balance, the ability to respond quickly to changing game conditions. We have chosen exercises that effectively influence the exteroceptive analyzers and contribute to the development of special coordination skills of handball players. In the experimental method, regular updating and variation of exercises, change of complexes, depending on indicators of preliminary and current testing, their execution in difficult conditions was assumed. We took into account the age characteristics of children, the magnitude of the load was differentiated, the exercise complexes were accessible for children of this age.

Special methods and tools already require a high level of development of abilities and skills; General and special methods were used in parallel in the training process. In order to successfully master new sports skills, visualization of movements, whose creation preceded the learning process itself, was of paramount importance. The proposed sets of exercises were performed from different starting positions (kneeling, lying on your back, sitting), the way of performing movements varied (mirror exercises), the dynamics of movements varied (faster and slower movements in light or complicated conditions, with burdens, with a partner). The spatial characteristics of the movements (reducing the size of the playing field, obstacles of different heights and at different distances) and external conditions (playing on different surfaces: sand, clay, grass; in windy and sunny weather) were further modified. In addition, EG athletes performed the proposed exercises in the absence of time and in stressful conditions, the unusualness and coordination complexity of the exercises gradually increased, the number of series and repetitions decreased. In the preparatory part of the training, during the workout, all exercises were performed with balls (tennis and handball weighing up to 330 grams).

The dynamics of changes in the level of development of indicators is a confirmation of the effectiveness of the implementation of the experimental program of development of coordination qualities. It should be noted that the comparison of the results of young handball players of the experimental and control groups after the experiment revealed significant differences between them ($p < 0.05$). Comparative analysis of indicators of the level of development of the coordination qualities of the experimental and control groups revealed that the athletes of the experimental group have a more significant increase. Analysis of changes in the average group indicators of coordination abilities after the pedagogical experiment revealed positive trends among CG athletes, but more progress was made among EG athletes.

Thus, according to the results of the test «shuttle run 4x9 m», the indicators improved in the athletes of EG by 13.44% ($p < 0.0001$) and in the athletes of KG by 7.64% ($p < 0.0001$), under the test «snake run with 2x9m dribbling « by 9.28% ($p < 0.0001$) in EC boys and 6.45% ($p < 0.0001$) in KG boys. According to the results of the test «throwing a handball at the target» in sportsmen EG by 40.81% ($p < 0.0001$), and in sportsmen KG only by 11.09% ($p > 0.05$). According to the results of the test «passing the ball in pairs», the performance of EG athletes improved by 13.13% ($p < 0.0001$), and for CG athletes by only 10.87% ($p > 0.05$).

Conclusions. The established problematicity of the investigated question allowed to define and develop an experimental methodology aimed at the development of coordination qualities of handball players of 10-11 years.

The positive dynamics of the level of development of coordination among young handball players determined to evaluate the effectiveness of the training process before the experiment and after a deliberate pedagogical influence on the selected components of coordination qualities.

The results of the experiment confirm the validity of the recommendations on the use of integrated influence tools, focused on the development of coordination skills in the training of young, 10-11 years old, handball players. The results of the statistical analysis show that the coordination abilities of EG athletes are higher. Therefore, it can be concluded that both programs have a positive effect on the development of coordination, but the experimental program has proven to be more effective. The use of exercises with the use of balls in the preparatory and final parts of the training, specially designed sets of exercises effectively affect the development of coordination skills of young athletes, which is necessary for success in this sport.

Prospects for further research. Further research involves the search for new modern approaches to sports training that will focus on identifying the reserves of the components of physical fitness of players in handball at different stages of sports training.

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ПЕДАГОГИЧЕСКИЕ И ДИДАКТИЧЕСКИЕ ПРИНЦИПЫ, ОПРЕДЕЛЯЮЩИЕ ПРИМЕНЕНИЕ СПОРТИВНЫХ ТРЕНАЖЕРОВ В ПРОЦЕССЕ ФИЗИЧЕСКОГО ВОСПИТАНИЯ СТУДЕНТОВ

Естественнонаучное познание человеческой деятельности все чаще объектом своих исследований выбирает физическую культуру и спорт. Человек стремится создать себе наилучшие условия жизни в окружающей среде, которая требует от него и психофизических все более повышенных интеллектуальных и психофизических способностей. Организм человека противостоит большим психофизиологическим нагрузкам в условиях трудовой деятельности и учебы. Свой негативный отпечаток накладывают неблагоприятные экологические условия, что приводит к дополнительным напряжениям. В таких условиях необходимо воспитывать, особенно в студенческой среде, пластичность и приспособляемость к изменяющимся социально-экономическим условиям.

В.В.Кузнецов в свое время высказывался о том, что тренажерные устройства дадут возможность задавать спортсменам нагрузку любой интенсивности и тем самым в лабораторных условиях выявлять резервные возможности организма. На примере спортсменов он изучал максимальные психофизические проявления человека, которые через несколько десятилетий становятся привычными для широких масс населения. Это научное направление изучает не только проявление максимальных возможностей организма человека, но и умение показать высокую точность, и экономизацию движений в субмаксимальных режимах, что необходимо не только в спорте, но и во многих профессиях, особенно на конвейерном производстве.

Ключевые слова: педагогические и дидактические принципы, спортивные тренажеры, физическая культура и спорт, психофизические способности, физические упражнения.

Анікеєнко Л.В. Педагогічні і дидактичні принципи, що визначають застосування спортивних тренажерів в процесі фізичного виховання студентів. *Природньо – наукове пізнання людської діяльності все частіше об'єктом своїх досліджень обирає фізичну культуру та спорт. Людина намагається створити собі найкращі умови життя в оточуючому середовищі, яке потребує від неї все більш підвищених інтелектуальних та психофізичних здібностей. Організм людини протистоїть великим психофізіологічним навантаженням в умовах трудової діяльності та навчання. Свій негативний відбиток накладає й шкідлива екологія, що призводить до додаткових навантажень. В таких умовах необхідно виховувати, особливо в студентському середовищі пластичність та здатність організму пристосовуватись до соціально – економічних умов, які змінюються.*

В. В. Кузнецов свого часу казав про те, що тренажерні пристрої надаватимуть змогу спортсменам задавати навантаження будь – якої інтенсивності та таким чином виявляти в лабораторних умовах резервні можливості організму. На прикладі спортсменів він вивчав максимальні психофізіологічні прояви людини, які через декілька десятиліть стають звичними для широких мас населення. Цей науковий напрямок вивчає не тільки прояв максимальних можливостей організму людини, але й вміння показати високу точність та економізацію рухів в субмаксимальних режимах, що необхідно не тільки в спорті, але й в багатьох професіях на конвейерному виробництві.

Необхідність постійного вдосконалювання учбово – тренувального процесу з фізичного виховання та з підготовки спортсменів вимагає розробку нових педагогічних та дидактичних технологій з використанням технічних засобів.

Ключові слова: педагогічні та дидактичні принципи, спортивні тренажери, фізична культура та спорт, психофізичні здібності, фізичні вправи.