RESEARCH ON THE EXPLOSIVE POWER OF THE LOWER LIMBS IN RHYTHMIC GYMNASTICS

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ABSTRACT
For sports experts, the question of developing explosive power abilities in competitors is of particular importance. Largely, explosive power is genetically determined by the presence of fast-twitch muscle fibers. On the other hand, coaches may influence the adolescent's ability to generate power through the methodology. Our study aims to enhance the explosive power of the lower limbs in 6- to 7-year-old girls participating in rhythmic gymnastics. The research was carried out with 22 gymnasts from two rhythmic gymnastics clubs in the city of Sofia. The methods we employed in our research included a study of specialized literature, sports-pedagogical testing, sports-pedagogical experiments, and mathematical-statistical methods. Two tests were used to determine the level of the explosive power of the lower limbs – vertical jump and standing long jump. Based on the testing results, we developed a methodology to enhance the explosive power of the lower limbs, which was applied to two groups. In the Experimental group, we applied a methodology using means from track and field athletics, and in the Control group, a methodology using means from rhythmic gymnastics. The analysis of the increase in indicators after the applied methodologies shows a statistically significant improvement in the results of the children from both groups, which confirms the effectiveness of the applied methodologies. The research showed that the methodology for developing the explosive power of the lower limbs using means from track and field athletics led to a greater increase in results compared to the methodology using means from rhythmic gymnastics. These results confirm the high effectiveness of the athletics methodology, which can be integrated as a complement to the existing methodologies of rhythmic gymnastics coaches.

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INTRODUCTION

Contemporary rhythmic gymnastics imposes high demands on competitors, who must possess a combination of strength, speed, endurance, flexibility, and coordination in order to perform routines that serve to demonstrate their skills.

Among the key physical qualities required for the successful execution of elements in rhythmic gymnastics, the explosive strength of the lower limbs holds a leading position. According to Gancheva (2009), in rhythmic gymnastics, explosive strength is manifested in a large number of movements and elements performed by gymnasts, particularly in jumps, which represent fundamental body movements in this sport. She states that training aimed at developing jumping capacity involves a substantial number of exercises designed to improve muscular strength in the lower limbs and, consequently, the capacity for generating impulse. The development of explosive strength in early childhood requires a precise consideration of the morphological and functional characteristics of the child's body, as well as an individualized approach (Rachev, 1981; Nikolova & Marinov, 2002).

Explosive strength, defined as the ability of muscles to generate maximal force in a short period of time (Zhelyazkov et al., 2020; Hadzhiev et al., 2011), has a direct impact on the height and quality of jump element execution in rhythmic gymnastics. Insufficient development of explosive strength may result in difficulties achieving the required height or stability during execution, as well as an increased risk of injury. This type of strength is considered one of the key factors influencing athletic performance across various sports disciplines (Miladinov & Velin, 2018). According to Marinova (2023), experts consider the development of competitors' explosive power abilities to be particularly important. She argues that, largely, explosive power is genetically determined by the presence of fast-twitch muscle fibers. On the other

hand, coaches may influence the adolescent's ability to generate power through the methodology. As pointed out by Gudev (2015) and Karabiberov (2016), training the explosive power of the lower limbs often involves exercises that aim to develop muscles and coordination in this region. Similarly, Aladzhov (2007, 2021) emphasizes the importance of this for athletes across various sports. In this regard, Verkhoshansky (1970) identifies the shock method as one of the most effective forms for developing explosive power in the lower limbs of gymnasts, a method more commonly referred to in contemporary Western literature as the plyometric method (Hadzhiev et al., 2011). Miladinov and Velin (2018) also assert that one of the most frequently used methods for developing explosive power is the so-called plyometric method, which involves a rebound jump following a drop from a height.

The application of such exercises in rhythmic gymnastics is not a new phenomenon, however, in recent years, there has been a growing interest in integrating training methods from other sports, particularly athletics, into the preparation of gymnasts.

Athletics offers a rich arsenal of means – such as jumps, sprints, starts, etc., which have a proven effect on the development of explosive power. However, their application in rhythmic gymnastics requires adaptation to the specifics of the training load, as well as to the age and skill level of the competitors ' sports training. Nevertheless, there is a need for empirical evaluation to assess their effectiveness compared to traditional approaches used in rhythmic gymnastics for developing the explosive power of children's lower limbs.

The significance of such research lies both in the expansion of scientific knowledge regarding the effectiveness of various training approaches and in the potential for the results to be applied by coaches and specialists in practice. Through the objective measurement of performance indicators before and after implementing the methodologies, an empirical basis is provided for optimizing early-age training, which has a long-term impact on the athletic development of gymnasts.

Aim and Objectives

The aim of the study was to develop the explosive power of the lower limbs of 6-7-year-old girls practicing rhythmic gymnastics.

In order to achieve the aim, the following *tasks* were set:

- To *conduct* a sports-pedagogical test to establish the level of explosive power of the lower limbs in 6-7-year-old girls practicing rhythmic gymnastics.
- To *design* and test in practice an exemplary methodology for developing the explosive power of the lower limbs using training means from both athletics and rhythmic gymnastics.
- To *monitor* the effect of the applied methodology.
- The study enables the evaluation of the effectiveness of different approaches to developing explosive strength. The inclusion of means from athletics is motivated by their proven effectiveness in enhancing the explosive power of the lower limbs.

METHODOLOGY

The study was conducted from October 2024 to January 2025.

Participants

The study involved 22 children from two sports clubs in the city of Sofia. The focus of the research was on examining the motor quality of explosive strength of the lower limbs of 6-7-year-old girls practicing rhythmic gymnastics.

Measurement and indexes

To determine the level of explosive power, a sports-pedagogical test was conducted. The test battery included two tests – the vertical jump and the standing long jump – to assess the explosive power of the lower limbs, meeting the criteria for standardization, reliability, validity, and objectivity. The testing was conducted twice – once at the beginning and again after the implementation of a sample methodology incorporating means from track and field athletics and rhythmic gymnastics. The collected data were used to compare the level of explosive power in children from both groups before and after applying the methodology.

Research methods

To fulfill the study's aims and objectives, the following methods were employed: a review of *specialized literature, sports-pedagogical testing, and a sports-pedagogical experiment*.

Procedure

The research was conducted in the rhythmic gymnastics hall during the children's regular training sessions. Testing was conducted by the research

team with the active participation of the participants' coach. Prior to the study, permission and informed consent were obtained from the parents regarding its purpose and the use of the collected data. All gymnasts participated voluntarily, and their identities were kept anonymous. Before the testing, a brief instruction and demonstration of the test battery were provided. The tests were conducted following a general warm-up to ensure the gymnasts felt prepared to demonstrate their abilities in the most optimal way for them. The equipment we used for the tests included a measuring tape and colored tape for marking. Each participant performed each test three times, and only their best results were used for analysis.

Based on the results of the initial testing, two approximately equivalent groups were formed: the Experimental group, consisting of 11 children, and the Control group, also comprising 11 children.

Study design

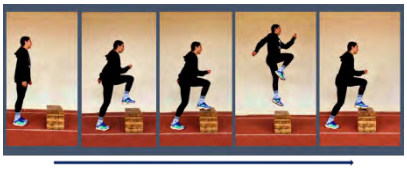
The experiment was conducted over a period of thirteen weeks, during which we monitored the impact of two sample methodologies for developing explosive strength of the lower limbs – one involving athletics-based means, applied in the Experimental group, and the other consisting of rhythmic gymnastics means, applied in the Control group.

Training in both groups took place five times a week, with the methodology being applied twice a week. The exercises were performed in the main part of the training session for 10 minutes. The training in both groups was identical, except for the exercises aimed at developing the explosive strength of the lower limbs.

Description of the sample methodology for developing the explosive power of the lower limbs

The sample methodology using means from athletics included 9 exercises, divided into means in the vertical plane and horizontal plane, as shown in Table 1. The sample methodology, which included means from rhythmic gymnastics, also featured 9 exercises, as shown in Table 2.

Table 1. *Example methodology with exercises from athletics*

	Exercise	Dosage	Illustration
Vertical plane	"Shcherbakov"	1 set x 10 reps	
	Consecutive jumps with alternating legs	1 set x 8 reps	
	Vertical jump on one leg	1 set x 4 reps on leg	
	Jump from the ankles	1 set x 10 reps	
	Two-legged jump – knees to chest	1 set x 10 reps	

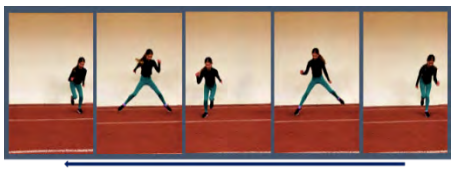
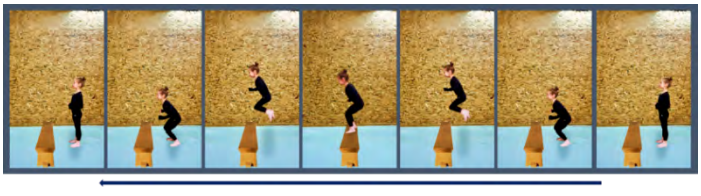
Horizontal plane	Alternate-leg bounding	1 set x 15 reps on leg	
	"Speed skater jumps"	1 set x 6 reps on leg	
	"Kangaroo" – consecutive two-legged long jumps	4 sets x 5 reps	
Combined planes	Consecutive plyometric jumps	3 sets x 4 reps	

Table 2. *Example methodology with exercises from rhythmic gymnastics*

Exercise	Dosage	Illustration
"Squat – Jump"	1 set x 10 reps	
Half squat – jump	1 set x 10 reps	
Alternate-leg hops	1 set x 5 reps (alternating each leg = 1 rep)	
Consecutive two-legged vertical hops onto a gymnastics bench	1 set x 8 reps	

Vertical hop onto a gymnastics bench and depth jump – plyometrics	1 set x 10 reps	
Straight-legged vertical rope jumps (in place)	1 set x 20 reps	
Hops over the rope	1 set x 10 reps	
Exercise at the ballet barre	1 set x 5 reps with the right and left supporting leg	
Ballet combination	1 set x 4 reps	

Data analysis

The results of the study were subjected to mathematical-statistical analysis with SPSS 25 and illustrated with Excel 2013. Depending on the tasks of the research, the following statistical methods were applied:

Variation analysis was used to determine the mean values (*Mean*) and the degree of dispersion for each of the examined indicators (S and V%), as well as to assess the normality of the distribution of empirical data (As and Ex) within each sample group.

A comparative Student's t-test was applied to verify the significance of differences between the mean values of the studied variables for both dependent (within the same group) and independent (between the two groups) samples. The critical value of the *t*-test for all examined samples, at a high confidence level of Pt ≥ 95%, was determined according to the methodology of Gigova (2009).

RESULTS

The variation analysis at the beginning of the study showed that all indicators in the examined groups exhibited a normal or near-normal distribution. Table 3 shows the results of the variation analysis of the experimental group.

Table 3. *Average values and variability of explosive power indicators of the experimental group*

Indicators	*n*	X min	X max	*R*	*Mean*	*SD*	V	As	Ex
Vertical jump (cm)									
Pre-intervention	11	20	32	12	23.91	3.11	13.02	1.878*	4.752*
Post-intervention	11	25	34	9	27.73	2.69	9.69	1.30	1.878
Standing long jump (cm)									
Pre-intervention	11	87	122	35	107.64	11.38	10.57	-0.351	-0.47
Post-intervention	11	95	128	33	116.36	9.55	8.21	-1.068	1.251

At the first measurement, the coefficient of variation for test 1, "Vertical jump" was above 12% (13.02%), indicating that the group was approximately homogeneous, while for test 2, "Standing long jump" the group was homogeneous, as the coefficient of variation was below 12% (10.57%). A larger range was observed in the "Standing long jump" – R = 35 cm.

By the end of the experiment, the coefficient of variation was below 12% for both indicators – 9.69% for test 1, "Vertical jump", and 8.21% for test 2, "Standing long jump", indicating that the group was homogeneous.

Table 4 shows the results of the variation analysis of the control group.

Table 4. *Average values and variability of explosive power indicators of the control group*

Indicators	*n*	X min	X max	*R*	*Mean*	*SD*	V	As	Ex
Vertical jump (cm)									
Pre-intervention	11	19	31	12	23.27	3.23	13.87	1.118	3.007*
Post-intervention	11	19	32	13	24.64	3.20	13.00	0.761	2.835*
Standing long jump (cm)									
Pre-intervention	11	63	115	52	94.55	17.39	18.39	-0.796	-0.664
Post-intervention	11	66	116	50	97.73	15.59	15.95	-0.951	-0.015

In the control group, the coefficient of variation at the beginning of the study for both indicators ranged between 12% and 30%, indicating that the group was approximately homogeneous. A larger range was again observed in the "Standing long jump" – R = 52 cm.

At the second measurement, the coefficient of variation for both indicators also ranged between 12 and 30%, with 13.00% for test 1, "Vertical jump", and 15.95% for test 2, "Standing long jump". This indicates that the group remained approximately homogeneous.

At the beginning of the experiment, the mean values of the children in both groups were similar for the first indicator "Vertical jump", while a significant difference was observed in the second – "Standing long jump". The analysis shows that the empirical value of the t-test for the "Vertical jump" was lower than the critical value, $t_{critical}$ = 2.09, whereas for test 2, "Standing long jump", the empirical and critical t-values were equal (Table 5). Nevertheless, it can be concluded that the two examined groups were relatively equivalent at the beginning of the sports-pedagogical experiment.

Table 5. *Significance of the differences between the average levels of the indicators of children of both groups at the pre-intervention*

Indicators	Experimental			Control			Difference	Statistical significance	
	n_1	$Mean_1$	SD_1	n_2	$Mean_2$	SD_2	*d*	*t* emp	*Sig.*
Vertical jump (cm)	11	23.91	3.11	11	23.27	3.23	0.64	0.47	.625
Standing long jump (cm)	11	107.64	11.38	11	94.55	17.39	13.09	2.09	.041

Note. $t_{critical}$ =2,09

The increase in the indicators measured by us in both groups is presented in Figures 1 and 2. Figure 1 shows that in the experimental group, there was a difference in the mean values of both indicators between the beginning and the end of the study. A greater improvement was observed in test 2 "Standing long jump" – 8.72 cm. In test 1, "Vertical jump" the increase was 3.82 cm.

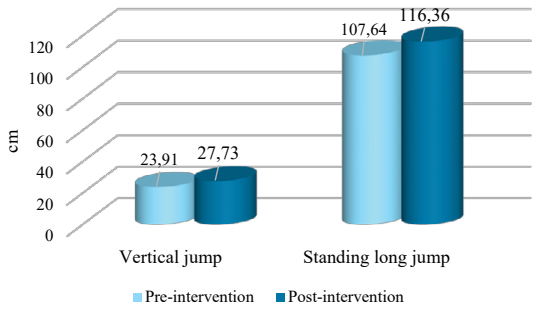


Figure 1. *Increase in the results of the children from the experimental group*

From the analysis of Table 6, it becomes evident that for both examined indicators, the empirical values of Student's t-test exceed the critical value $t_{critical}$ = 2.18, which indicates that the improvement is statistically significant. This provides grounds to conclude that the difference in the mean values is due to the effectiveness of the methodology we applied using track and field means.

Table 6. *Reliability of the increase of the indicators of children from the experimental group*

Indicators	*n*	Pre-intervention		Post-intervention		Statistical significance of differences			
		$Mean_1$	SD_1	$Mean_2$	SD_2	*d*	*d%*	*t*	*Sig.*
Vertical jump (cm)	11	23.91	3.11	27.73	2.69	3.82	15.97	7.91	.000
Standing long jump (cm)	11	107.64	11.38	116.36	9.55	8.73	8.11	6.41	.0001

Note. $t_{critical}$ *=2,18*

Figure 2 shows that there was also an improvement in the measured indicators in the control group, but with lower values compared to the experimental group. The increase in test 1, "Vertical jump" was 1.37 cm, and in test 2 "Standing long jump" – 3.18 cm.

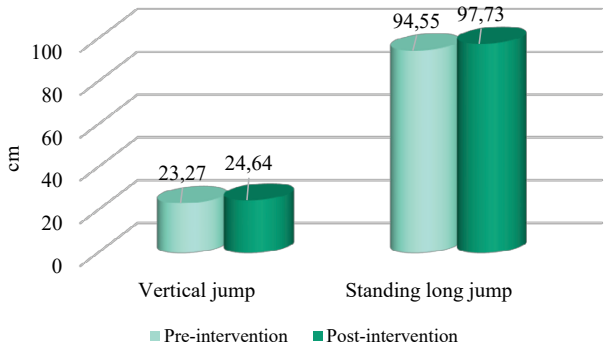


Figure 2. *Increase in the results of the children from the control group*

In the control group, the empirical values of Student's *t*-test exceeded the critical value $t_{critical}$=2.18 for both indicators, indicating that the increase is also statistically significant (Table 7). This means that the difference in the observed mean values is due to the effectiveness of the methodology we applied using rhythmic gymnastics means.

Table 7. *Reliability of the increase of the indicators of children from the control group*

Indicators	*n*	Pre-intervention		Post-intervention		Statistical significance of differences			
		$Mean_1$	SD_1	$Mean_2$	SD_2	*d*	*d%*	*t*	*Sig.*
Vertical jump (cm)	11	23.27	3.23	24.64	3.20	1.36	5.86	3.16	.010
Standing long jump (cm)	11	94.55	17.39	97.73	15.59	3.18	3.37	3.41	.007

Note. $t_{critical}$ *=2.18*

At the end of the experiment, significant differences were observed in the mean values of both indicators between the two groups, favoring the experimental group (Table 8). A difference of 3.09 cm was observed in the measured explosive power of the lower limbs in test 1, "Vertical jump". A larger difference was noted for the explosive power of the lower limbs in test 2 "Standing long jump" – 18.63 cm. The results of the comparative analysis indicate that the observed differences between the two groups are statistically significant for the indicators studied.

Table 8. *Significance of the differences between the average levels of the indicators of children of both groups at the post-intervention*

Indicators	Experimental			Control			Difference	Statistical significance	
	n_1	$Mean_1$	SD_1	n_2	$Mean_2$	SD_2	*d*	*t emp*	*Sig.*
Vertical jump (cm)	11	27.73	2.69	11	24.64	3.20	3.09	2.45	0.024
Standing long jump (cm)	11	116.36	9.55	11	97.73	15.59	18.63	3.38	0.003

Note. $t_{critical}$ *=2.09*

DISCUSSION

The results of the study confirm the effectiveness of both applied methodologies for developing the explosive power of the lower limbs in 6-7-year-old gymnasts. Both experimental groups demonstrated statistically significant improvement, but more substantial progress was recorded in the group that trained with means from athletics. This finding aligns with Marinova's (2023) observations, who emphasizes the importance of methodology in enhancing the ability to generate explosive strength from an early age.

The development of explosive power through hops, jumps, and plyometric exercises included in the sample methodology aligns with the recommendations of Hadzhiev et al. (2011), who identify the method of dynamic efforts as fundamental for this quality. Authors such as Zhelyazkov et al. (2020) also emphasize the need for a fresh state of the nervous system when performing speed-strength exercises – a principle that was followed in the planning of the sessions in the present study. Gancheva (2009) also confirms the importance of explosive power in jumps – one of the main groups of body elements in rhythmic gymnastics, directly related to competitive success. In this regard, the observed improvement in test results demonstrates a real application of scientific principles in practical training. From a practical standpoint, the results support the idea that carefully selected means from athletics can enrich the content of training in rhythmic gymnastics and facilitate the mastery of complex technical elements. In this sense, the study provides specific guidance for methodological work for coaches – specialists working with children in early childhood.

CONCLUSIONS

At the beginning of the research period, the differences in the values of the studied indicators between the children from the two experimental groups were not statistically significant, which ensured their initial homogeneity and guaranteed the methodological correctness of the experiment. At the end of the sport-pedagogical experiment, the values of the coefficient of variation in both groups indicated homogeneity, which provided statistical validity for the comparative analysis of the results. When analyzing the improvement of the indicators at the end of the experiment revealed a statistically significant enhancement in the results of the children from both groups, confirming the effectiveness of the applied methodologies, as the methodology for developing the explosive power of the lower limbs through track and field-based means led to a greater improvement in the results compared to the methodology using means from rhythmic gymnastics. The comparative analysis of the differences between the mean values at the end of the experiment showed that the experimental group achieved better results in both tests for the explosive power of the lower limbs, confirming the high effectiveness of the athletics-based methodology.

From a practical perspective, it would be beneficial to conduct further research analyzing the effects of different methodologies for developing the explosive power of the lower limbs in children practicing rhythmic gymnastics, in order to achieve even better results and optimize the training process. The results of such studies will be presented in our future publications.

REFERENCES

Aladjov, K. (2007). *Mnogofunktsionalnata sashtnost na fizicheskata podgotovka v sporta* [The multifunctional essence of physical preparation in sports]. Sofia: Tip-top Press.

Aladjov, K. (2021). *Narachnik na konditsionnia trenyor* [Handbook of the conditioning coach]. Sofia: Simolini 94.

Gadev, M. (2015). O*snovi na zagryavaneto vav futbola* [Basics of warming up in football]. Sofia: NSA Press.

Gancheva, G. (2009). *Skokovete v hudozhestvenata gimnastika (teoriya i metodika)* [Jumps in rhythmic gymnastics (theory and methodology)]. Sofia: NSA Press.

Gigova, V. (2009). Statisticheski metodi vav fizicheskoto vazpitanie: Uchebni zapiski za studenti ot magistarska stepen na NSA [Statistical methods in physical education: Study notes for master's degree students of NSA]. Sofia: NSA Press.

Hadzhiev, N., Andonov, K., Dobrev, D., & Petrov, V. (2011). *Fizicheska podgotovka* [Physical preparation]. Sofia: NSA Press.

Karabiberov, Yu. (2016). *Konditsionna podgotovka vav voleybola* [Conditioning training in volleyball]. Sofia: Bio Fit.

Marinova, T. (2023). Dynamics of explosive power development in young athletes. *Journal of Applied Sports Sciences, 2,* 12–21. Sofia: NSA Press. https://doi.org/10.37393/JASS.2023.02.2

Miladinov, O., & Velin, V. (2018). Kinematic-dynamic interrelations between the drop jump on inclined platform and the take-off in the horizontal athletics jumps. *Journal of Applied Sports*

Sciences, 1, 3–13. Sofia: NSA Press. https://doi.org/10.37393/jass.2018.01.1

Nikolova, E., & Marinov, B. (2002). *Dvigatelna aktivnost, uchilishte, semeystvo* [Motor activity, school, family]. Sofia: Bolid-ins EOOD.

Rachev, K. (1981). *Optimizirane fizicheskata podgotovka na mladi sportisti* [Optimization of physical preparation of young athletes] (Doctoral dissertation). Sofia: VIF.

Verkhoshansky, Y. (1970). *Osnovy spetsial'noy silovoy podgotovki v sporte* [Fundamentals of special strength training in sports]. Moscow: Fizkultura i Sport.

Zhelyazkov, Tsv., Dasheva, D., & Neykov, S. (2020). Osnovi na sportnata trenirovka [Basics of sports training]. Sofia: Bolid-Ins.

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