

Original research paper

**THE INFLUENCE OF PHONETIC GYMNASTICS
ON THE DEVELOPMENT OF FINE MOTOR SKILLS
OF PRESCHOOL CHILDREN**

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Abstract. *The development of fine motor skills of preschool children is extremely important, because this ability refers to the coordination of small muscle groups of the hands, which are used in performing tasks such as writing, coloring and cutting. The aim of this research is to determine the influence of phonetic gymnastics program on the development of fine motor skills of preschool children. The research was conducted on a sample of 30 respondents, children attending a younger educational group. The experimental program consisted of a phonetic gymnastics activities which consisted of three parts: introductory, main and final part of the activity, and was conducted for 12 weeks. The introductory part of the activity lasted for about five minutes and a complex of shaping exercises was conducted in it, followed by speaking exercises, e.g. imitating the blowing wind (whizz), the flying bee (buzz) and others. The main part of the activity lasted for 20 minutes, and in this part, various moving and speaking games and songs were used, in order to stimulate children's interest. For the purpose of this research, two subtests from the battery of BOT2 tests (Bruinkins – Oseretsky Test of Motor Proficiency, Second Edition) were applied: fine motor integration and manual dexterity. The obtained results confirmed the positive influence of programmed phonetic gymnastics on the fine motor skills of preschool children. The implementation of this type of treatment in preschool institutions would be of great benefit, especially because it is relatively short (about 30 minutes) and does not require special equipment and space.*

Key words: *phonetic gymnastics, fine motor integration, manual dexterity, physical activity, preschool children*

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1. INTRODUCTION

The growth of a child in the system of all-round human development plays an extremely important role. From the very birth of a person, his attitudes towards health, as well as physical and intellectual abilities develop. Habits of movement are formed, speech and motor skills are developed, and he adapts to the environment (Lubysheva, 2016). The period of early childhood, i.e. preschool age, is also marked by a more expressive development of new motor skills. Their development is based on solving simple motor tasks during the first three years of life, which after acceptance and adoption become more sophisticated and complex (Mikas, 2009). Crucial, but often neglected for the physical, cognitive, as well as social development of the child, is the movement (Cools, De Martelaer, Samaey, & Andries, 2009) which represents the movement of the body or its parts in space (Perić & Petrović, 2015).

The development of motor skills in early childhood is observed through two aspects: the development of gross and fine motor skills; where the term *gross motor skills* refers to the use of larger muscle groups of the whole body for the purpose of performing more complex motor tasks, such as running, jumping, grasping, etc., which are necessary to move, maintain control and balance of body and objects (Radomski & Trombly-Latham, 2008). On the other hand, fine motor skills refer to the coordination of small muscle groups, especially of the hands, which are used in performing tasks such as writing, coloring and cutting (Smith, 2003; Sortor & Kulp, 2003; Gallahue & Ozmun, 2006; Dinehart & Manfra, 2013). Also, fine motor skills play a key role in many everyday activities such as self-care, feeding and dressing (Marr, Cermak, Cohn, & Henderson, 2003; Van der Linde et al., 2013). The importance of fine motor overall, and especially in children's development is also shown by a study conducted by McHale and Cermak (1992) in which they proved that children spend between 30% and 60% of their school day performing fine motor tasks.

Nowadays, when physical inactivity becomes one of the leading causes of poor health of the entire population, the fine motor skills of preschool children are neglected. The development of motor skills provides a wide range of actions, so that researchers are given space to examine the best methods for the best possible progress (Bruininks & Bruininks, 2005). As the development of physical, mental and social well-being of children and adults can be influenced by a number of factors, research such as Haydari, Askari and Zarra (2009) can provide important conclusions about how the home environment and the load within it can affect a child's development.

In the last decade, due to the problem of hypokinesia, the idea of creating programmed sports schools has experienced a great expansion. In a review study, with the topic of the relationship between physical activity and motor skills in preschool age, Figueroa and An (2017) proved a positive correlation in eight of the eleven studies. However, this relationship depends on several factors such as the intensity of physical activity and the type of motor skills. Therefore, the problem of finding an ideal program exists, although a large number of authors have tried to reach the same goal. One of them is Brown (2010), who after the implementation of the program called Primary Movement, in 65 boys and girls aged four to five years, found a statistically significant progress of the experimental group, and thus showed the positive effects of this type of program. Daya (2017) proved that programmed stacking of glasses (sport stacking), lasting for five weeks, leads to the improvement of fine motor skills of preschool children. The positive effect of programmed occupational therapy on the development of fine motor skills called

Response to Intervention (RtI) Tier 1, designed by the American Association for Occupational Therapy, was found by Ohl et al. (2013). They conducted this type of occupational therapy program in preschool children for ten weeks and thus helped the experimental group with statistically significant progress, while in the group that was not included in the program there was a slight decrease in the level of fine motor skills. On the other hand, in their longitudinal study, Uzunović et al. (2017) with the help of BOT-2 battery tests obtained statistically significant differences between the group which conducted additional sports programs within preschool institutions, and the control group which had no additional activity, and thus found that the programmed sports school can affect the development of fine motor skills to a great extent. Randjelović, Stanišić, Dragić, Piršl, and Savić (2018) also spoke about the positive effects of physical activity and the order of the processes of developing physical coordination of preschool children, through different types of games. Through their research, they found that voluntary control and coordination between arm, hand and finger movements, both hands, as well as between hands and eyes, can be greatly improved with the help of guided and free physical activities on playgrounds, moving games and morning gymnastics.

In their research, Kim, Tael, Seo, Liew, and Hammond (2016) tried to design a special interface, as a new method, based on shape sketching, in order to more accurately assess children's fine motor skills, while reducing the hard work of experts. They came to the conclusion that their interface, called Easy-Sketch, is extremely effective, and that the most suitable age for the development of fine motor skills in children is the age of five.

Referring to the study by Kim et al. (2016), it can be clearly concluded that modern technology imposes more modern methods of assessing the development of children's abilities, so that older studies, which therefore use older methods of assessment and development, become neglected. However, there is currently little evidence of how technological and technical innovations affect the development of children's fine motor skills (Gaul & Issartel, 2016). The impact of modernization of technology on the development of fine motor skills was examined by Lin, Cherng, and Chen (2017), who in a sample of 40 children aged 48-72 months, conducted a program of using touch screen tablets over 60 minutes per week and indicated that excessive use of touch screen tablets can cause negative effects on the development of fine motor skills. However, despite the large number of possibilities for action, the best method of developing fine motor skills of preschool children has not been defined yet. On the other hand, researches remain vague because the topic concerning the development of fine motor skills of preschool children is complex, so that a small number of papers can bring a final and general conclusion about the "ideal" model for their development.

In this regard, the aim of this study is, in accordance with modern times and the need to find the best possible method, to examine the impact of phonetic gymnastics programs on the development of fine motor skills of preschool children.

2. METHOD

The research was conducted on a sample of 30 respondents, namely children who attend a younger educational group (from 3 to 5 years) in a preschool institution in Niš. Prior to testing, parents were asked for written consent to participate in the research. The research was conducted in accordance with the Declaration of Helsinki.

For the purpose of this research, a battery of tests BOT2 [Bruinkins – Oseretsky Test of Motor Proficiency, Second Edition (Bruininks & Bruininks, 2005)] was used to assess the development of basic and fine motor efficiency, which is regularly used to identify people with small to medium motor coordination deficit. It is applicable at the age of 4 to 21, and the tasks are similar to games and are not difficult to explain. An abbreviated version of selected tests related to the topic of the paper was used. The following subtests were used in the research:

- Fine motor integration (copying circles and squares; copying overlapping circles and curved lines; copying curved lines; copying triangles; copying diamonds; copying stars; copying overlapping pencils); and
- Manual dexterity (drawing dots in a circle; transferring coins; placing "dice" in the board; sorting cards; arranging objects).

The experimental program consisted of a phonetic gymnastics activity which consisted of three parts: introductory, main and final part of the activity and was conducted for 12 weeks. The introductory part of the activity lasted for about five minutes and a complex of shaping exercises was conducted in it, followed by speaking exercises, e.g. imitating the blowing wind (whizz), the flying bee (buzz) and others. The main part of the activity lasted for 20 minutes, and in this part various moving-speaking games and songs were used, in order to stimulate children's interest. Some of the games are: "On the farm", "Zoo", "Wild animals", "Domestic animals" and others. During the given activities, children imitate the movements of the given animals, performing various forms of movement such as: walking, running, jumping, skipping, galloping, jumping, walking "four-legged", turns, crawling, rolling, throwing, catching, hitting and the like. Along with various songs, fine motor activities are performed, such as: movements of following the fingers in time, movements of twitching and stretching the fingers, movements of the fist up and down, etc. The final part of the activity lasted for five minutes and was intended for stretching and relaxation exercises, with breathing exercises and voice games (ssssss, zzzzzz, shhhhh ...).

All statistical analyzes were performed using IBM SPSS Statistics (Version 20). Descriptive statistics were used to calculate Mean and Standard Deviation (SD) for each variable separately. The normality of the data distribution was examined using the Kolmogorov-Smirnov test. The Wilcoxon rank test was used for the differences between the initial and final measurements. The alpha level was set to $p < 0.05$ to indicate statistical significance.

3. RESULTS

Table 1 shows the basic statistical parameters for all variables of fine motor integration on the initial and final measurement, as well as the test results for the normality of the distribution. By interpreting the results, it can be noticed that the mean value of the obtained results increased after the final measurement in six variables, while in two variables the mean value of all results remained unchanged. In this regard, the very beginning of the statistical analysis of the results can highlight the positive impact of the phonetic gymnastics program.

Table 1 Descriptive statistics and differences for fine motor integration variables on final and initial measurement

Variables	IN (Mean ± SD)	FIN (Mean ± SD)	Z	Diff. (FIN – IN) Asymp. Sig. (2-tailed)
KKk	3.80 ± .407	4.00 ± .000	-2.449	0.014
KKv	6.00 ± .000	6.00 ± .000	0.000	1.000
KKP	4.80 ± 1.031	6.00 ± .000	-3.999	0.000
KKL	1.00 ± .743	1.33 ± .479	-3.162	0.002
KT	3.80 ± 1.126	3.80 ± 1.126	0.000	1.000
KD	1.20 ± 1.064	2.20 ± .484	-3.825	0.000
KZ	1.00 ± .910	2.00 ± .910	-5.477	0.000
KPO	1.00 ± .830	2.00 ± .830	-5.477	0.000

Legend: KKk Copy circle; KKv Copy squares; KKP Copying Overlapping Circles; KKL Copy curved line; KT Copy triangle; KD Copying diamonds; KZ Copying the star; KPO Copying overlapping pens; IN Initial measurement; FIN Final measurement

Analyzing the normality of data distribution with Kolmogorov-Smirnov test of normality, it was determined that the results deviate from the normal distribution, which further required the use of nonparametric statistical analyzes, i.e. Wilcoxon rank test. It should be noted that four variables (KKv IN, KKr FIN, KPK FIN, KKv FIN) were omitted from the analysis because their value was recognized as a constant.

The differences between the initial and final measurements, related to the fine motor integration tests, were examined using the Wilcoxon rank test. Interpreting the results (Table 1), we come to the conclusion that there are statistically significant differences between the initial and final measurements, in all measured variables.

The manual dexterity of the respondents was assessed with the help of five tasks, and the obtained results on the initial and final measurement were presented with the help of descriptive statistics (Table 2).

Table 2 Descriptive statistics and differences for manual dexterity variables on initial and final measurement

Variable	IN (Mean ± SD)	FIN (Mean ± SD)	Z	Diff. (FIN – IN) Asymp. Sig. (2-tailed)
CTK (15 s)	2.47 ± .776	3.47 ± .776	-5.303	.000
PN (15 s)	2.27 ± .740	4.13 ± .730	-4.922	.000
SBT (15 s)	2.03 ± .809	3.40 ± .855	-4.964	.000
SK (15 s)	2.50 ± .974	3.10 ± .481	-2.990	.003
NP (15 s)	1.20 ± .714	2.03 ± .718	-5.000	.000

Legend: CTK Drawing dots in a circle; PN Coin transfer; SBT Placing "stings" in the board; SK Map Sorting; NP Sequence of subjects; IN Initial measurement; FIN Final measurement

The examination of the normality of the data distribution was performed with the help of the Kolmogorov-Smirnov test, which indicated a statistically significant deviation of the obtained results from the normal distribution.

Since the distribution of the obtained results deviates from the normal distribution of data, further analysis was approached using non-parametric statistical analyzes. Based on the analysis and interpretation of the results obtained after the Wilcoxon rank test, a statistically significant difference was found between the two measurements for all variables of manual dexterity (Table 2).

4. DISSCUSION

In this paper, where the experimental group was included in the phonetic gymnastics program, the aim was to examine the progress in the development of fine motor skills of preschool children, used movement-speech games and songs. Vigotski (1996) argues that children explore their own possibilities and the world around them. In this way, they develop their motor, intellectual, social-emotional, communication and creative abilities (De Privitellio, Caput-Jogunica, Gulan, & Boschi, 2007). During the game, children are maximally engaged, using the acquired knowledge, experience and skills. The success of performing motor tasks through play can greatly affect the child's sense of security in the company of others (Bratovčić, 2005). They also perform tasks very patiently, which is rarely noticed in some other activities. Psycho-motor activities of children aged four to five enable the understanding of more complex actions, while in the previous period, these activities were mainly directed towards the manipulation of objects.

Any research, in which some kind of experimental treatment was conducted in preschool age, resulted in the improvement of all abilities that the researchers tried to influence (Iivonen, Nissinen, Sääkslahti, & Liukkonen, 2007; Hraski, Stojšavljević, & Hraski, 2009; Brown, 2010; Ohl et al, 2013; Daya, 2017; Uzunović et al., 2017; Randjelović et al., 2018). Even the increase in the total volume of physical exercise, with the same activities that are applied, gave positive effects on the improvement of fine motor skills of preschool children (Savičević, Suzović, & Dragić, 2012). There are many ways for children to learn and prepare for the development of fine motor skills through play. This implies that participation in movement games, with an emphasis on writing and speaking exercises, includes limited activities, primarily in the domain of motor skills (Randjelovic et al., 2018).

Similar to other available research, the results obtained in this study also confirm the positive impact of programmed exercise on fine motor skills of preschool children. The application of the phonetic gymnastics program statistically improved the results in all eight variables of fine motor integration. The good influence of phonetic gymnastics on the development of fine motor skills is reflected in the fact that the respondents in their final tests set a statistically significant progress based on the minimum results shown in the tables. Namely, with six of the eight variables, an increase in the minimum score of points by 50% was noticed, which is a clear indicator of the positive effect of the applied program. On the other hand, if we look at the manual dexterity of the respondents and their progress in the final measurement, it is evident that the respondents improved their results by at least 50% compared to the initial measurement. In all five variables, the average minimum score on the final test indicated great progress of the respondents. The positive impact can be noticed by observing the maximum results, which are significantly increased, which also confirms that phonetic gymnastics is one of the effective methods for the development of fine motor skills. However, the obtained results should be taken with a dose of caution since it was not determined how much the respondents were familiar with the tasks to be performed on the initial and final measurement.

This study had several limitations. The first refers to the sample of respondents, which was small in this study. Second, differences between respondents in relation to gender were not taken into account. Third, it should be noted that the analysis was done only on the basis of the differences obtained in the experimental group, and the final effect could not be determined.

5. CONCLUSION

In conclusion, this study indicates that the phonetic gymnastics program, applied to preschool children, can have a positive impact on the development of fine motor integration, as well as manual dexterity. The implementation of this type of treatment in preschool institutions would be of great benefit, especially because it is relatively short (about 30 minutes a day) and can be carried out with entire groups. Another advantage of the phonetic gymnastics program is that it does not require special equipment and space, because it is based mainly on activities in which children imitate movements and voices. Professional training of staff working with groups is desirable.

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UTICAJ FONETSKE GIMNASTIKE NA RAZVOJ FINE MOTORIKE DECE PREDŠKOLSKOG UZRASTA

Razvoj fine motorike dece predškolskog uzrasta je izuzetno značajan, jer se ova sposobnost odnosi na koordinaciju malih mišićnih grupa ruku, posebno šake, koji se koriste u izvođenju zadataka poput pisanja, bojenja i sečenja. Cilj ovog istraživanja je da se utvrdi uticaj programa fonetske gimnastike na razvoj fine motorike dece predškolskog uzrasta (od 3 do 5 godina). Istraživanje je sprovedeno na uzorku od 30 ispitanika, dece koja pohađaju mlađu vaspitnu grupu. Eksperimentalni program činila je aktivnost fonetske gimnastike koja se sastojala iz tri dela: uvodnog, glavnog i završnog dela i koja se sprovodila 12 nedelja. Uvodni deo aktivnosti trajao je oko pet minuta i u okviru nje je sproveden kompleks vežbi oblikovanja praćen govornim vežbicama, npr. oponašanje vetra koji duva (fjuuuuu), pčelice koja leti (bzzzzzz) i drugim. Glavni deo aktivnosti trajao je 20 minuta i u ovom delu korišćene su razne pokretno-govorne igre i pesmice, kako bi se podstaklo dečije interesovanje. U svrhu ovog istraživanja primenjena su dva podtesta iz baterije testova BOT2 (Bruinkins–Oseretsky Test of Motor Proficiency, Second Edition): fina motorička integracija i manuelna spretnost. Dobijeni rezultati su potvrdili pozitivan uticaj programiranog vežbanja fonetske gimnastike na finu motoriku dece predškolskog uzrasta. Implementacija ovakve vrste tretmana u predškolske ustanove bila bi od velike koristi, posebno iz razloga što je relativno kratkog trajanja (oko 30 minuta dnevno) i ne zahteva posebnu opremu i prostor.

Ključne reči: fonetska gimnastika, fina motorička integracija, manuelna spretnost, fizička aktivnost, predškolski uzrast.