1 - THE INFLUENCE OF SWIMMING ON MOTOR COORDINATION IN CHILDREN OF 3 TO 6 YEARS

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Introduction

Motor coordination can and should be worked on in children from birth. According to a study carried out by Garanhani (1997), in the age group between 3 and 6 years, adequate motor stimulation is necessary through diversified experiences that provide the development of basic motor abilities for the child.

The therapeutic effects of exercises in water go beyond promoting relaxation, rehabilitation of paralyzed muscles, as well as strengthening muscles and developing their strength and resistance and improvement of functional activities of walking, which involve motor coordination and equilibrium (Weeks & Kordus 1998).

According to Kuchma, Vishnevskaia and MaKarova (2006), all these aspects can be developed in the swimming session with the exploration of games being fundamental, a focus which is very effective when working with motor coordination and is efficient in developing abilities in children of 3 to 6 years of both sexes. Garanhani (1997), through a theoretical investigation of other existing studies in the area of motor development in children of the same age group (3 to 6 years), confirms that motor stimulation is adequate through diversified experiences that offer the development of basic motor abilities for children.

Methodology

From an initial sample of 210 children aged between 3 to 6 years, being 120 children from CEMS Miécimo da Silva Sports Center in the municipality of Rio de Janeiro and 90 children from CEADM Arlinda Donadello Moreira Educational Center in the municipality of Seropédica, tests of motor coordination with the protocol of Lefèvre (1972) were used. Children presenting disturbances in motor coordination were selected for the study, totaling a sample of 105 children divided into the following groups: Experimental Group 59 children; Control Group 46 children.

The program of infantile swimming was carried out two times per week, each session having a duration of 40 minutes, in a pool heated to 28ºC, for a period of 4 months. All training was always carried out at the same time and included the following methodology:

- exercises of movement: forward, backwards, to the sides, around an axis and around their own axis;
- exercises strengthening the muscles of superior and inferior members, educative exercises for the legs and arms, respiratory and relaxing exercises.
- some educative exercises for the swimming styles of the crawl, back stroke, breast stroke and butterfly stroke, adapted for the age group studied.

The exercises were all standardized and repeated weekly during the sessions. During the period of the study the control group did not take part in any swimming program, being restricted to realizing only the daily physical activities of the school.

The children were re-evaluated after 4 months using the same protocol as for selection (Lefèvre 1972).

Tests that Verified Motor Coordination: Index finger to nose; turn pages of a book; copy a cross; make a ball of paper; wind thread onto a bobbin; open one hand and close the other, alternately; touch all fingers with the end of the thumb; trace a circle with index fingers wind the thread from the bobbin onto the index finger of the dominant hand; tap the right index finger on the table; force the trunk of the body backwards.

Results

For each age group evaluated, a distribution frequency was elaborated by which the percentage of normal individuals and individuals with disturbance was verified in each group studied, based on the protocol of Lefèvre (1972), which considered as normal a rate of success above 75%.

In tables 1 to 4, the percentage of children is shown who committed 0, +1, +2 or more errors in the relevant tests where the evolution can be seen from the results between pre-test (grey column) and the post-tests in the control and experimental groups.

Result of the Evaluation of Motor Coordination 3 years:

In the inter-group analysis of the pre-test stratum, no significant statistical differences were observed between the respective distributions.

In the post-test, in the 3-year age group, 4 children (36.36%) of the control group succeeded in carrying out the test in a satisfactory form, whilst in the experimental group, 9 children (64.29%) of the sample showed positive results in all the tests, statistically significant differences not being observed ($p=0.2601 > 0.05$) between the distributions (table 1).

TABLE 1: Comparison of Pre- and Post-test Evaluation of Motor Coordination – 3 years

Nº of errors in activity realized	Control Group Pre-test	Control Group Post-test	Experimental Group Pre-test	Experimental Group Post-test
0	18.18%	36.36%	42.85%	64.29%
+1	54.54%	54.54%	21.42%	35.71%
+2	27.27%	9.09%	35.71%	-

The percentage values refer to the number of children belonging to the sample.

Result of the Evaluation of Motor Coordination - 4 years

In the inter-group analysis in the pre-test stratum, statistically significant differences ($p= 0.5724 < 0.05$) were not observed between the distributions of frequencies of the number of errors of the control and experimental groups.

In the post-test, 4 children (40%) succeeded in realizing the test in a satisfactory form in all the items, while in the experimental group 8 children (50%) of the sample showed all results positive, this value being very significant as no child obtained such success in the pre-test (table 2).

TABLE 2: Comparison of Evaulation of Motor Coordination – 4 years

Nº of errors in the activity realized	Control Group Pre-test	Control Group Post-test	Experimental Group Pre-test	Experimental Group Post-test
0	10%	40%	-	50%
+1	30%	30%	18.75%	43.75%
+2	30%	30%	25%	6.25%
+3	20%	-	37.5%	-
+4	10%	-	18.75%	-
+5	-	-	-	-

The percentage values refer to the number of children belonging to the sample.

Result of Evaluation of Motor Coordination 5 years

In the 5-year age group no child in the control group succeeded in realizing the test in a satisfactory form in all the items of the pre-test; in the same way in the experimental group there were no children who demonstrated all positive results.

In the inter-group analysis in the pre-test stratum, significant statistical differences ($p= 0.2839 < 0.05$) were not observed between the distribution of frequencies of the number of errors of the control and experimental groups.

The post-test for this age group presents significant results, considering that in the control group 2 children (16.66%) of the sample presented all positive results, while in the experimental group these values represent 41.66%, that is, 5 children with positive results in all the tests (table 3).

TABLE 3: Comparison of Evaluation of Motor Coordination – 5 years

Nº of errors in activity realized	Control Group Pre-test	Control Group Post-test	Experimental Group Pre-test	Experimental Group Post-test
0	-	16.66%	-	41.66%
+1	-	25%	-	41.66%
+2	33.33%	33.33%	33.33%	16.66%
+3	33.33%	8.33%	33.33%	-
+4	16.66%	-	25%	-
+5	16.66%	16.66%	8.33%	-
+6	-	-	-	-

The percentage values refer to the number of children belonging to the sample.

Result of Evaluation of Motor Coordination 6 years

In the pre-test stratum significant differences were not observed ($p= 0.4241 < 0.05$) between the distribution of frequencies of the number of errors of the control and experimental groups.

In the post-test for the 6-year age group, only 1 child of the control group (7.69%) succeeded in realizing all the test in a satisfactory way, whilst in the experimental group 5 children (29.41%) presented positive results in all the items described (table 4).

TABLE 4: Comparison of Evaluation of Motor Coordination – 6 years

Nº of errors in activity realized	Control Group Pre-test	Control Group Post-test	Experimental Group Pre-test	Experimental Group Post-test
0	7.69%	7.69%	-	29.41%
+1	15.38%	38.46%	5.88%	47.05%
+2	7.69%	38.46%	29.41%	23.52%
+3	38.46%	15.38%	41.17%	-
+4	30.76%	-	23.52%	-

The percentage values refer to the number of children belonging to the sample.

Discussion

Considering the post-test strata, all the age groups studied show improved performance, the children in the age groups of 4 and 5 years being most outstanding, in 100% and 91.6%, respectively.

Contrary to Lefèvre (1972), the authors Arvin, Behrman and Kliegman (1997) point out that children of 3 years of age are able to alternate their feet when ascending or descending stairs and children of 4 years of age can jump using a single foot. In the present study, a large number of children did not alternate feet when ascending or descending stairs.

When the 6-year old children of the experimental group are observed, it is noted that the percentage of children who presented all results positive in the pre-test was 64.7%, while in the post-test this rose to 94.12%, that is, a performance improvement of 29.42%. Such values become very significant when compared with the control group who, for the same items and age group, did not present any improvement, maintaining the percentage of 46.15% both in the pre-test and the post-test.

For Lima (1998), a child of 3 years is already able to copy a cross. In the present study great difficulty was observed in the realization of this test by children of 4 years, belonging to the control group.

A child of 4 years is already able to throw a ball at a target and, at 5 years, copy geometric figures (Arvin, Behrman e Kliegman 1997). For Lefévre (1972), the test of throwing a ball at a target should be applied to children from the age of 5, as well as the test of copying geometric figures.

The ability to turn the pages of a book and scribble, developing autonomy in handling books and visual-motor coordination, are abilities dominated by children of 1 year of age (Arvin, Behrman e Kliegman, 1997). This assertion contradicts the affirmations of Lefèvre (1972), where the test of turning the pages of a book should be applied to children from 4 years of age. In our study positive and negative indices were observed, some children of 4 years not performing such a task, demonstrating disturbance in the development of motor coordination.

The evaluation of motor coordination and equilibrium is fundamental at the pre-school age of the child, for the alteration of such abilities can interfere with learning at school and in the general conduct and daily activity of the child (Mascaretti 1999). In this study it was verified in the post-test, in the experimental group, a large number of the children presented normality in respect of motor coordination. On the other hand, in the same period, most of the children in the control group showed negative results during the realization of the tests. The 5-year age group stands out, presenting 83.32% of the negative results.

It is important to emphasize that the environment in which the child interacts has fundamental importance in motor development, which would, therefore, alter the results encountered.

According to Ninot, Bilard and Deligniers (2005), the environmental and instrumental conditions can facilitate or hamper the learning of new motor abilities. This assertion supports what we found in our study, for the control group, which obtained the most negative results in the post-test, did not have the interference of swimming when compared to the group that showed a different reality regarding this aspect.

With the object of analyzing the evolution of the corporal model in pre-school children from 4 to 6 years in the Municipal Teaching System at Maringá, Ferrari (1995), concluded that the knowledge that a child has of himself/herself can be influenced by the capacity to develop abilities such as: agility, rhythm, coordination, equilibrium and perception of the outside world.

The 5-year old children obtained little improvement in motor development after the practice of swimming compared to the other age groups, this being the only age group that did not present improvement in the post-test performance. This could indicate that, for these children, another motor stimulus would be necessary for their performance to achieve a more significant statistical improvement. Another factor to be considered is suggested by King, Law, King, et al, (2003), where the frequency of the sections and the daily participation in physical activities are considered fundamental for the development of motor abilities in children who present deficiency in these abilities.

It was verified that for the variable motor coordination, all the ages studied of the control group did not present alteration from pre- to post-test, the same not occurring for the ages 3, 4 and 6 in the experimental group.

It is very important to emphasize that the delay in development of motor coordination can affect the whole life of the child, with irreversible consequences for adult life. Among these consequences stands out slowness in execution of corporal movements and the relation between the body and the environment in which the child is included, increasing its motor difficulties (Ferreira, 2000).

In the analysis of motor coordination in the 3 to 6 year old age group, the experimental group showed more satisfactory results than the control group in the post-test, suggesting that swimming could be the activity responsible for the difference between the children studied.

Conclusion:

Swimming was shown as an efficient instrument in minimizing possible disturbance in motor coordination for children in the 3 to 6 year old age group. Despite this, it is still necessary that the 5-year old children be submitted to new tests using quantitatively more children and greater frequency of motor practice.

From the work carried out with swimming satisfactory results were achieved for the improvement of the daily activities and quality of life of these children.

From the conclusions presented, in which it is seen that swimming, as motor conduct, positively provides for these failings, we can say that we aggregate value as a structural quality to the existential life of these children who, thus, have an improvement in their quality of life.

With such shortcomings attended, probably new shortcomings would arise and need to be diagnosed, which opens the way for future studies, always with a view to improving the quality of life of the children, who are in this world in a never ending quest to became a Human Being.

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Abstract

This study aims to analyze the influence of swimming on motor coordination in children of 3 to 6 years. 105 children from 3 to 6 years of age took part in the experiment and were divided into two groups: experimental group children who practiced swimming and; control group children who did not practice swimming. The experimental group was composed of 59 students who, as well as daily activities, practiced only swimming and who presented disturbance in motor coordination. The control group was composed of 46 students who presented these same disturbances and did not practice any physical activity apart from daily activities. Both the groups were selected for the pre-test in accordance with the protocol established by Lefèvre (1972). The program of infantile swimming was carried out for the experimental group two times per week for four months. After this period the children were re-evaluated using the same protocol (Lefèvre, 1972) for the post-test. In the analysis of motor coordination, significant differences were verified in the ages of 3, 4 and 6 years, where the experimental group showed more satisfactory results than the control group in the post-test. The children of 5 years obtained little improvement in motor development after practicing swimming and the data from this study suggest that experiments should be conducted with a larger sample for a new evaluation, using the same protocol.

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THE INFLUENCE OF SWIMMING ON MOTOR COORDINATION IN CHILDREN OF 3 TO 6 YEARS

Abstract

This study aims to analyze the influence of swimming on motor coordination in children of 3 to 6 years. 105 children from 3 to 6 years of age took part in the experiment and were divided into two groups: experimental group children who practiced swimming and; control group children who did not practice swimming. The experimental group was composed of 59 students who, as well as daily activities, practiced only swimming and who presented disturbance in motor coordination. The control group was composed of 46 students who presented these same disturbances and did not practice any physical activity apart from daily activities. Both the groups were selected for the pre-test in accordance with the protocol established by Lefèvre (1972). The program of infantile swimming was carried out for the experimental group two times per week for four months. After this period the children were re-evaluated using the same protocol (Lefèvre, 1972) for the post-test. In the analysis of motor coordination, significant differences were verified in the ages of 3, 4 and 6 years, where the experimental group showed more satisfactory results than the control group in the post-test. The children of 5 years obtained little improvement in motor development after practicing swimming and the data from this study suggest that experiments should be conducted with a larger sample for a new evaluation, using the same protocol.

Key Words: children, motor coordination, swimming

L'INFLUENCE DE LA NATATION SUR LA COORDINATION MOTRICE DES ENFANTS DE 3 A 6 ANS

Résumé

Cette étude a eu pour objectif d'analyser l'influence de la natation sur la coordination motrice des enfants de 3 à 6 ans. Ont participé de cette expérience 105 enfants entre 3 et 6 ans qui ont été partagées en deux groupes : expérimental des enfants qui pratiquaient la natation, et contrôle des enfants qui ne pratiquaient pas la natation. Le groupe expérimental était composé de 59 élèves, qui, en plus de leurs activités quotidiennes, pratiquaient la natation seulement et présentaient des altérations de la coordination motrice. Le groupe contrôle était composé de 46 élèves qui présentaient les mêmes altérations et ne pratiquaient aucune activité physique en plus de leurs activités quotidiennes. Les deux groupes ont été sélectionnés pour le pré-test d'après le protocole établi par Lefèvre (1972). Le programme de natation infantile a été réalisé pour le groupe expérimental, deux fois par semaine, pendant quatre mois. Après cette période les enfants ont été réévalués en utilisant le même protocole (Lefèvre, 1972) pour l'après-test. Dans l'analyse de la coordination motrice, il a été vérifié une différence significative pour les âges de 3, 4 et 6 ans, âges pour lesquels le groupe expérimental a montré des résultats plus satisfaisants que le groupe contrôle dans l'exécution de l'après-test. Les enfants de 5 ans ont obtenu peu d'amélioration dans leur développement moteur après la pratique de la natation et les données de cette étude suggèrent l'utilisation d'un échantillon plus nombreux pour de nouvelles évaluations qui utiliseraient le même protocole.

Mots-Clés: enfants, coordination motrice, natation

LA INFLUÊNCIA DA NATACIÒN EN LA CORDENACIÒN MOTORA EN NIÑOS DE 3 A 6 AÑOS

Resumo

Este estudio tuvo como objetivo analisar a influencia de la natación en la cordenación motora en niños de 3 a 6 años. Participaram del experimento 105 niños de 3 y 6 años que se dividieron en dos grupos: Experimento - niños que hacian natación, y control niños que no hacian natación, el grupo experimento fue compuesto por 59 alunos, estos que, además de sus actividades diarias, hacian natação solamente, e tenian cambios en la cordenación motora. El grupo control tenia 46 alunos, que tenian los mismos disturbios não practicavam ninguna actividad fuera de las diarias. Los grupo fueron escojidos para la preuba, de acuerdo com el protocolo establecido por Lefévre (1972). El programa de natación infantil fue hecho para el grupo experimento, dos veces por semana, por quatro meses, despues de este tiempo los niños tuvieron nueva prueba, se uso el mismo metodo (Lefévre, 1972) para la pós-prueba. En la avaluación se pudo ver diferenciación significante en las edades de 3, 4 y 6 años, el qual grupo experimento tuvo resultado más satisfáctorios en las pruebas, de lo que el grupo control en la prueba de después. Los niños de 5 años tuvieron poca mejoria en el desenvolvimiento motor, después del ejercicio de natación y los datos de este estúdio, sugeriran una muetra mejor para nuevas pruebas, usando el mismo sistema.

Palabras-claves: niños, cordenación motora, natación.

A INFLUÊNCIA DA NATAÇÃO NA COORDENAÇÃO MOTORA EM CRIANÇAS DE 3 A 6 ANOS

Resumo

Este estudo teve como objetivo analisar a influência da natação sobre a coordenação motora em crianças de 3 a 6 anos. Participaram do experimento 105 crianças entre 3 e 6 anos que foram divididas em dois grupos: experimental crianças que praticavam natação, e controle crianças que não praticavam natação. O grupo experimental foi composto por 59 alunos, os quais, além das atividades diárias, praticavam natação somente e apresentavam alterações de coordenação motora. O grupo controle foi composto por 46 alunos que apresentaram esses mesmos distúrbios e não praticavam qualquer atividade física além das atividades diárias. Ambos os grupos foram selecionados para o pré-teste conforme o protocolo estabelecido por Lefèvre (1972). O programa de natação infantil foi realizado para o grupo experimental, duas vezes por semana, durante quatro meses. Após esse período as crianças foram reavaliadas utilizando-se o mesmo protocolo (Lefèvre, 1972) para o pós-teste. Na análise da coordenação motora verificou-se diferença significativa nas idades de 3, 4 e 6 anos, onde o grupo experimental mostrou resultados mais satisfatórios na realização dos testes do que o grupo controle no pós-teste. As crianças de 5 anos obtiveram pouca melhora no desenvolvimento motor após a prática da natação e os dados deste estudo sugerem uma amostra maior para novas avaliações utilizando-se o mesmo protocolo.

Palavras-chaves: crianças, coordenação motora, nataçã**O**