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ORIGINAL RESEARCH

Weekly frequency of a motor intervention program for day care babies

Frequência semanal de um programa de intervenção motora para bebês de berçário

Ejercicios físicos en pacientes con neuropatía diabética: una revisión sistemática y del metaanálisis de estudios clínicos controlados

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ABSTRACT | The main goal of this research was to compare the effect of a Motor Intervention Program (MIP) on the development of babies in public preschools in Porto Alegre. The study included 59 infants, stratified randomly into three groups: 18 infants met three times a week (3X G); 23 babies met once a week (1XG); and 18 control individuals (CG). Visual (three minutes), manipulation of objects (seven minutes) and strength, mobility, and stabilization (ten minutes) tasks were performed. The instrument used was the Alberta Infant Motor Scale (AIMS) to evaluate the babies' motor development. The study results showed an improved classification from 1XG babies (p = 0.007). The 3XG babies had the most significant difference in the prone posture, sitting and standing, despite being younger. In conclusion, the babies who underwent motor intervention one or three times a week had better results when compared to the control group.

Keywords | Child Development; Child Day Care Centers, Physical Therapy Modalities.

RESUMO | O objetivo do estudo foi comparar o efeito de um Programa de Intervenção Motora no desenvolvimento de bebês de escolas de educação infantil públicas de Porto Alegre. Participaram do estudo 59 bebês, estratificados aleatoriamente em três grupos: 18 bebês atendidos três vezes por semana (G3X); 23 bebês atendidos uma vez por semana (G1X) e 18 bebês do grupo controle (GC). Foram realizadas tarefas de perseguição visual (três minutos), manipulação de objetos (sete minutos) e força, mobilidade e estabilização (dez minutos). O instrumento utilizado foi a *Alberta Infant Motor Scale* (AIMS) para avaliar o desenvolvimento motor dos bebês. Os resultados do estudo mostraram que os bebês do G1X foram os que melhoraram na classificação (p=0,007); nas posturas, foram os bebês do G3X que obtiveram diferença significativa maior na postura prono, sentado e em pé, mesmo sendo mais novos. Em conclusão, os bebês que realizaram intervenção motora, uma ou três vezes por semana, obtiveram melhores resultados quando comparados ao grupo controle.

Descritores | Desenvolvimento Infantil; Creches; Modalidades de Fisioterapia

RESUMEN | Este estudio tiene por objeto comparar el resultado de un programa de intervención motora en el desarrollo de bebés en un jardín de infantes públicos de la ciudad de Porto Alegre, Brasil. Del estudio, participaron 59 bebés, clasificados aleatoriamente en tres grupos: 18 bebés atendidos tres veces por semana (G3X); 23 bebés atendidos una vez por semana (G1X) y 18 bebés del

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grupo control (GC). Se llevaron a cabo tareas de persecución visual (tres minutos), manejo de objetos (siete minutos) y fuerza, movilidad y estabilización (diez minutos). Se empleó el Alberta Infant Motor Scale (AIMS) para análisis del desarrollo motor de los bebés. Los resultados mostraron que los del G1X fueron quienes presentaron mejoras en la clasificación (p=0,007), mientras que en las posturas, fueron los G3X quienes presentaron mayores diferencias significativas en las posturas prono, sentada y de pie, aun siendo más jóvenes que los demás. Se concluye que los bebés que realizaron intervención motora, una o tres veces por semana, presentaron mejores resultados en la comparación con los del grupo control.

Palabras clave | Desarollo Infantil; Guarderias Infatiles; Modalidades de Fisioterapia.

INTRODUCTION

Early childhood is crucial in the global development of the child, as it is defined by significant changes occurring in an accelerated rate[1]. At this stage, there's brain growth and maturation of the neural structures that provide advances in the cognitive, emotional, and social spheres. Thus, the baby's learning ability is increased by brain plasticity, the ability of the Central Nervous System (CNS) to transform its organizational structure in response to environmental stimuli[2,3].

The exploitation of the environment provides diverse adaptive strategies that allow the child to interact with the environment. This phenomenon between subject and environment is called affordance. Affordances will be built only from experience, the perception of the child in relation to the context, to objects, animals or other people[4,5]. Thus, the environment in which the child is inserted can act as a facilitator to its development, as well as an unfavorable environment may restrict the pace and limit the possibilities of motor learning and acquisition in children[6].

Other variables can also influence that environment, such as the educational level of the parents, family income, family ties with the child[7,8], educators, and health professionals[9]. Often, the professional is required to supply for possible experience faults and opportunities weaknesses suffered by children in their context, through interventional programs[10-12].

With the insertion of women in the labor market in recent decades, children began being admitted to day care schools in the early years of life. The intervention of professionals with training in the area of child development became necessary to leverage the experimentation of experiences geared to children who are still at a young age[6]. If the child shows developmental delays, an intervention becomes essential. Researchers point to the need to trace interventive strategies and educational activities that promote the improvement of care offered to children by family members and by educators in day care centers[13-15], especially during the first three years of life[16,17]. Studies[18] indicate that the interventions performed three times a week promote motor development; in that same direction, other studies[19] state that the intervention performed once a week is already able to generate important achievements and improvement in skills.

Due to the relevance of intervention programs for motor development of children, this study aimed at comparing the effect of a Motor Intervention Program (MIP) in babies from public day care schools at the city of Porto Alegre, Brazil, visited three times a week, once a week, and a control group.

METHODOLOGY

Delineation and participants

This is an experimental study with quantitative and correlational approach[20], applied to the real conditions of babies in public day care schools. The calculation of the size of the sample was carried out in the PEPI (Programs for EPIdemiologists) software, version 4.0. For a significance level of 5%, a power of 90% and a regular standardized effect size (TEP≥0.6)[21] of the intervention in different scales, produced a total of at least 30 babies. Babies were randomly divided into three groups: 18 babies were attended three times a week (3XG); 23 babies were attended once a week (1XG), and 18 babies formed the control group (CG). The selection of babies in the aforementioned groups occurred according to a draw, in a total of six day care schools.

The inclusion criteria established were: (a) being adapted to the school for more than two weeks[22]; (b)

not participating in any motor or cognitive intervention program; (c) not presenting any kind of chronic or severe disease, which would continuously impair study participation; (d) not having a history of hospitalization in the period of the intervention; (e) returning the informed consent form duly signed by the legal guardians before the start of the intervention.

This study had the approval of the Research Ethics Committee, under number 20854, according to resolution 466/12 of the National Health Council.

Implementation of the Intervention and Procedures

MIP was conducted by three physical therapists and an undergraduate student, and by a physical education teacher and an undergraduate student. There was a previous training of two weeks to standardize MIP.

The intervention program was suitable for the day care routine, and was implemented for two months, three times a week (3XG), once a week (1XG), and a group without intervention (CG). The CG had the same routine of babies who participated in the intervention, that is, had feeding and sleeping schedules, were exposed to interaction with the teachers and had opportunities to play, however, without the MIP intervention. MIP did not interfere in the sleeping routine (away from their routine sleep time - more than two hours of range) and the feeding of the babies (at times when the baby was not hungry, at least one hour before feeding). In case of illness, the intervention was not performed.

The individualized protocol was based on a previous study[6] and fitted to the conditions of the schools, ensuring the ecological validity of the study[23]. The following were performed: (1) visual follow-up tasks (three minutes) characterized by visual tracking of moving objects at a distance of approximately 40 cm[24]; (2) handling of various objects (seven minutes) in function, form, texture and weight [25]; (3) strength, mobility, and stabilization (ten minutes), with trunk control activities, sitting, rolling over, dragging or crawling and decubitus exchanges (exercises were carried out in which babies rolled down to sit, passed to crawling, to their knees, kneeling to standing position, orthostasis, and walking), each baby performed the activities within their possibilities, always with the associated toy[26]. The activities were carried out for twenty minutes on the floor and in the same sequence, that is, visual follow-up, handling the toy, and postural control[6]. After the stimulation, the baby returned to the crib, to the seat or to the ground, according to the day care routine.

Instruments

The Alberta Infant Motor Scale (AIMS)[27] was used to evaluate the motor development of the babies. The evaluators were blinded and did not know to which group each baby belonged. There was a previous training for two weeks with physicians in the area and the intervenors were different from the evaluators. The AIMS is an observational scale of easy application used to qualify movement, which has been translated and validated for the Brazilian population[28]. This scale was kindly provided by the group: "Assessment and Motor Intervention – School of Physical Education – Federal University of Rio Grande do Sul". The scale refers to child motor performance and discusses concepts of motor development such as: neural maturation; evaluation of the sequence of motor development; progressive development; and the integration of the anti-gravitational muscle control in four positions: prone, supine, sitting and standing, a total of 58 items. Each posture has positions that the baby assumes and assigns a point, creating a score at the end. The score of the four postures is added and thus originates a total gross score obtained by the test, which is converted to a motor percentage level, comparing them to individuals with equivalent levels in standard samples in a table, which goes from 0 to 100%. With this motor percentage level, the babies can be categorized as: typical (normal), suspected delay (suspicion) and delay[28]. Typical, if the percentage level is above 25%; suspected delay if the percentage level stays between 5 and 25%, and, delay if the percentage level is below 5%.

Data analysis

Data collected from all evaluations were stored in a database using the Statistical Package for the Social Sciences (SPSS) software, version 18.0. Average and standard deviation values were used in the description of the profile. Data was submitted to the exploratory analysis to verify the normality of distribution through the Shapiro-Wilk Test. Inferential analyses were performed using the nonparametric tests of

Wilcoxon Signed Ranks Test for intra-group postures, and McNemar's Chi-Square Test was used for intra-groups motor development. Kruskal-Wallis and Mann Whitney Tests were used for the comparisons between groups, considering a significance level of 5%[21].

RESULTS

Sample characterization

The results presented in Table 1 refer to the data of the 59 babies characterized by attending public day care schools.

Table 2 shows the results of the categorization of the motor development before and after intervention considering the time factor.

Table 3 shows the total gross score, motor percentile score, and posture scores considering the time factor.

Before intervention, in comparisons between groups 3XG, 1XG, and CG, there was no statistically significant difference, with the exception of the supine posture (p=0.039). After the intervention, there was no statistically significant difference between the groups. The Mann Whitney test was used between the groups to verify what was the difference in the supine posture. In the comparison between 3XG and 1XG, a significant difference in supine posture was observed (p=0.012), as well as in the comparison between 3XG and CG (p=0.045); in the comparison between 1XG and CG, there was no difference between the groups (p=0.749).

We needed to use a variance analysis to observe which variable could be interfering in the results of the study. We verified that age presented a significant effect (p=0.030). Comparing the groups separately, differences between 3XG and 1XG were observed (p=0.029), as well as between 3XG and CG (p=0.014). Regarding age, 1XG and CG were not significant.

Table 1. Sample characterization

Characteristics	Total sample (n=59)	3XG (n=18)	1XG (n=23)	CG (n=18)
Age (months) – Average ± SD	11.1 ± 3.8	9.3 ± 2.1	11.9 ± 4.2	12± 4.2
Sex – n (%)				
Male	30 (50.8)	13 (43.3)	10 (33.3)	7 (23.3)
Female	29 (49.2)	5 (17.2)	13 (44.8)	11 (37.9)

Table 2. Categorization of motor development before and after the intervention (time factor)

Motor development categories	3XG (n=18)		p*	1XG (n=23)		p*	CG (n=18)		p*
	Before n (%)	After n (%)		Before n (%)	After n (%)		Before n (%)	After n (%)	
Delay	5 (27.8)	3 (16.7)	<0.084	7 (30.4)	1 (4.3)	<0.007	5 (27.8)	2 (11.1)	<0.060
Suspect	3 (16.7)	1 (5.6)		5 (21.7)	3 (13.0)		3 (16.7)	2 (11.1)	
Normal	10 (55.6)	14 (77.8)		11(47.8)	19 (82.6)		10 (55.6)	14 (77.8)	

* McNemar Chi-Square Test

Table 3. Scores in the postures, total score and motor percentile score in the time factor

AIMS Score	3XG (n=18)		p*	1XG (n=23)		p*	CG (n=18)		p*
	Before Avg±SD	After Avg±SD		Before Avg±SD	After Avg±SD		Before Avg±SD	After Avg±SD	
Prone	15.5±5.7	19.4±4.1	<0.003	16.8±6.1	18.8±4.0	<0.007	16.8±6.3	18.6±4.3	<0.018
Supine	9.3±3.1	8.8±0.8	<1.000	8.0±1.5	8.8±0.7	0.003	7.9±1.7	8.6±1.0	<0.014
Seated	9.7±2.7	11.2±2.1	<0.003	10.0±3.3	11.2±2.0	<0.005	9.5±3.6	11.1±2.2	<0.005
Standing	7.0±4.5	12.2±3.8	<0.000	9.7±5.4	13.0±4.2	<0.000	10±5.9	12.3±5.0	<0.003
Gross total	41.1±13.7	51.6±9.9	<0.001	44.5±15.4	51.6±10.4	<0.000	43.7±17.4	50.4±11.9	<0.003
Perc total	35.8±32.1	43.9±24.9	<0.256	31.7±28.8	53.9±24.2	<0.003	38.5±31.5	47.8±27.7	<0.005

* Wilcoxon's Test

DISCUSSION

In 2005, a study pointed out that babies were maintained in strollers and cribs for a long time during the day[24]. However, a similar research conducted a few years later observed that the strategies of routine activities for babies had changed[29]. The cribs and strollers were replaced by activities on the floor, providing further exploration. The toys also became more accessible to children, being chosen according to their age. That modification was also observed in this study. But the question was whether the frequency of motor intervention through bodily experiences offered to babies would make a difference in that development.

The results observed in this study showed that babies who performed intervention activities once a week benefited to the extent of providing a change of their qualifying category of development. That explains the positive aspects generated by an organized program of intervention in day care school babies, even once a week. Regarding the postures, significant differences were found in all for the X1G, stressing the supine postures, total gross score, and percentile score. Supine posture is also stimulated in interventions, however, in less intensity than the other anti-gravity postures. The prone, sitting, and standing postures would provide possibilities for baby to better explore the environment[31]. At the beginning of the Program, the babies stayed too much in the supine posture, therefore we encouraged new postures and encouraged the educators to perform them as well. In the twenty minutes dedicated for postural control, the babies were in prone posture, rolled down, sat, held in four support spots, and stood up.

The group that received motor intervention three times a week presented a difference between the scores before and after intervention that was greater in the prone, sitting, and standing postures. The prone position is very important to the motor repertoire of the first year of life, because it prepares the anti-gravity muscles for sitting and orthostasis. An interventional work was carried out with babies at risk of delay in the development from the fifth month of life. The intervention was specific for strolling. That study found that, after the intervention, those babies at risk were closer in development to the typical babies of the same age[31]. An interventional, specific, focused, and structured work for babies develops certain postures, as an aid in the course of their development.

The CG has developed less on all counts. We understand that biological factors ensure the development of the baby, but the stimulation in specific development programs can generate different gains in postural control and cognitive issues[32]. The results of the present study corroborate the author's findings and reinforce the importance of opportunity and structural and systematic practice of an intervention for which the fundamental motor skills are developed to the fullest[33]. Moreover, skills are not refined naturally so that children achieve greater efficiency and to adapt its execution to context requirements. In that case, the conditions of the school and the professional's performance as a promoter of motor interventional activities shall promote significant developmental changes[34].

In this study, we observed that babies of the CG had the same routines of the babies of the groups that received intervention: feeding and sleeping schedules, being exposed to interaction with the teachers, and had opportunities to play. However, the targeted activities of the MIP corroborated with the best results for 1XG and 3XG babies.

These findings lead us to reflect on the importance of encouraging infants from an early age to participate in systematic activity programs, so that they become proficient in various motor skills required in their day-to-day lives. Contrary to common sense that the kids will develop naturally as they become older, the results of this study indicate that the infants' motor development can suffer important restrictions when there is a lack of adequate stimulation[35].

We indicate as limitations to this study the absence of MIP interaction with families (it was performed only with educators). However, for babies who presented motor delay, a feedback to parents and teachers was made, and these same infants continued a follow-up of the MIP.

We also indicate the lack of control of some features of children regarding social class, educational level of parents, family structure and household experiences of babies as a limitation.

CONCLUSION

We conclude to this study, in general, that babies who performed the MIP three times a week improved their scores in relation to prone posture, sitting posture and standing posture when compared to the others, even if

they are younger. Babies who took part in the MIP once a week showed superiority in their development when compared to the control group.

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