

Physical therapy with toys and dog-assisted therapy in infants: observational study

Fisioterapia com brinquedos e terapia assistida por cães em lactentes: estudo observacional

Fisioterapia con juguetes y terapia asistida por perros en lactantes: un estudio observacional

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ABSTRACT | This study aimed to compare physical therapy with toys with dog-assisted therapy in the neuromotor development of 4-month-old infants with and without neuromotor alterations. This is a qualitative descriptive and observational study carried out with 10 infants, who were evaluated by the Alberta Infant Motor Scale, divided into Group 1 (G1) and Group 2 (G1), and subdivided into Toy Group (TG1 and TG2) and Dog Group (DG1 and DG2) for the performance of fortnightly interventions. By the Affordances in the Home Environment for Motor Development – Infant Scale, we assessed the opportunities present in the home environment. Qualitative data were analyzed using photos and videos. The presence of a dog in DG1 and DG2 resulted in a relaxed and fun environment, infants interested in touching the animal's fur, alternating limb movements, eye contact, sound production, increased social interaction, and feeling of security. In TG1 and TG2, decrease in motivation was observed as well as the absence of sound production and eye contact by infants, and interest in touch restricted to toys that had different colors and sounds, with little agitation and motivation for motor skills in those groups. We concluded that the dog's presence promoted better motor, social, affective, and cognitive results. Animal-assisted therapy can be an effective method to support conventional physical therapy for infants with delayed neuropsychomotor development.

Keywords | Child Development; Physical Therapy; Animal-Assisted Therapy.

RESUMO | O objetivo deste trabalho foi comparar a fisioterapia com brinquedos com a terapia assistida por cães no desenvolvimento neuromotor de lactentes de

quatro meses de idade com e sem alterações neuromotoras. Trata-se de pesquisa descritiva e observacional de caráter qualitativo, realizada com 10 lactentes, que foram avaliados pela escala motora infantil de Alberta (EMIA), divididos em grupo 1 (G1) e grupo 2 (G1) e subdivididos em grupo brinquedo (G1B e G2B) e grupo cão (G1C e G2C) para a realização das intervenções quinzenais. O questionário *Affordances in the Home Environment for Motor Development – Infant Scale* (AHEMD-IS) foi escolhido para avaliar as oportunidades presentes no ambiente domiciliar. A análise de dados qualitativos foi feita por meio de fotos e filmagens. A presença do cão nos grupos G1C e G2C resultou em um ambiente descontraído e divertido, interesse dos lactentes em tocar o pelo do animal, movimentos alternados de membros, contato visual, emissão de sons, evolução na interação social e sentimento de segurança. Nos grupos G1B e G2B, constatou-se diminuição da motivação, ausência de emissão de sons pelos lactentes e contato visual e interesse pelo toque restrito a brinquedos que tivessem diversas cores e sons, havendo pouca agitação e motivação para as habilidades motoras nesses grupos. Conclui-se que a presença do cão promoveu melhores resultados motores, sociais, afetivos e cognitivos. A terapia assistida por animais pode ser um método eficaz para auxiliar na fisioterapia convencional de lactentes com atraso no desenvolvimento neuropsicomotor.

Descritores | Desenvolvimento Infantil; Fisioterapia; Terapia Assistida com Animais.

RESUMEN | El objetivo de este estudio fue comparar la fisioterapia con juguetes con la terapia asistida por perros

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en el desarrollo neuromotor de los lactantes de cuatro meses con y sin trastornos neuromotores. Se trata de una investigación cualitativa, descriptiva y observacional, realizada con 10 lactantes, quienes fueron evaluados por la escala motora infantil de Alberta (EMIA), divididos en grupo 1 (G1) y grupo 2 (G1), y subdivididos en grupo juguete (G1J y G2J) y el grupo con perro (G1P y G2P) para realizar las intervenciones quincenales. El cuestionario *Affordances in the Home Environment for Motor Development – Infant Scale* (AHEMD-IS) se aplicó para evaluar las oportunidades presentes en el entorno domiciliario. El análisis de los datos cualitativos se realizó a partir de fotografías y filmaciones. La presencia del perro en los grupos G1P y G2P resultó en un ambiente relajado y divertido, interés de los lactantes por tocar el pelaje del animal, alternancia de

movimientos de las extremidades, contacto visual, emisión de sonidos, evolución en la interacción social y sensación de seguridad. En los grupos G1J y G2J hubo disminución de la motivación, ausencia de emisión de sonidos por parte de los lactantes y contacto visual e interés por el tacto restringido a los juguetes que tenían diferentes colores y sonidos, además de haber poca agitación y motivación para la motricidad en estos grupos. Se concluyó que la presencia del perro promovió mejores resultados motrices, sociales, afectivos y cognitivos. La terapia asistida por animales puede ser un método eficaz para ayudar en la fisioterapia convencional para los lactantes con retraso en el desarrollo neuropsicomotor.

Palabras clave | Desarrollo Infantil; Fisioterapia; Terapia Asistida por Animales.

INTRODUCTION

Health professionals seek alternatives that allow children to interact with the environment, a phenomenon called affordances. The use of specific toys as children development facilitators is common in the physical therapy scientific literature¹⁻⁴. Thus, the relationship between subject and environment is only built based on experience, from the child perception regarding the context, objects, animals, or other people⁵⁻⁸.

For many years, human-animal interaction has been defined as beneficial. One of the ways this interaction can be used is by animal-assisted therapy (AAT), which consists in the use of animals for therapeutic purposes⁹. The use of dogs in therapies with children has contributed to increase self-esteem, improve motor skills, social interaction and behavioral reactions, promote relaxation and joy, and offer security¹⁰⁻¹³. The presence of a therapy dog allows for infants to remain more focused and aware of their social environment^{14,15}.

In order to obtain results about infant neuromotor development and the diverse existing therapies, including AAT, we used quantitative and qualitative methods. Quantifying human-animal interactions in AAT by qualitative methods may generate good quality behavioral data¹⁶⁻¹⁸. Therefore, this study aimed to compare physical therapy with toys with dog-assisted therapy in the development of 4-month-old infants with and without neuromotor alterations.

METHODOLOGY

This is a qualitative descriptive and observational study applied to neuromotor development of 4-month-old infants¹⁹. The methodological description of this study was made according to the guidelines of the Standards for Reporting Qualitative Research (SRQR)^{20,21}.

The inclusion criteria for study participants were: 4-months-old infants—chronological or corrected age, accepting a variation up to ± 1 week, in relation to the date of birth—at the beginning of the intervention; infants of both sexes; infants whose parents/guardians signed the informed consent form; infants and companions without dog allergy. The exclusion criterion was infants with dog allergy.

The Alberta Infant Motor Scale (AIMS) was used to evaluate the neuromotor development of infants^{22,23}, and to evaluate the opportunities present in the home environment, the Brazilian version of the *Affordances in the Home Environment for Motor Development – Infant Scale* (AHEMD-IS) questionnaire was used²⁴.

A total of ten participants met the established inclusion criteria and were included²⁴. The study was carried out in the pediatrics sector of the Pontifical Catholic University of Campinas (PUC-Campinas), and the participants were accompanied by their mother and/or another guardian. The evaluations lasted 20 minutes each, respecting the participants' sleep and feeding schedule.

Based on the AIMS results, the infants were randomly divided (www.random.org) into two groups:

Group 1 (G1) and Group 2 (G2). G1 consisted of infants who got AIMS score over 25% of the percentile curve, and G2 consisted of infants with a score below 25%. Thereafter, G1 was subdivided into Toy Group 1 (TG1) and Dog Group 1 (DG1), and G2 into Toy Group 2 (TG2) and Dog Group 2 (DG2) (Figure 1)¹⁷. The inclusion of ten infants was based on the study by Elmacı and Cevizci⁸.

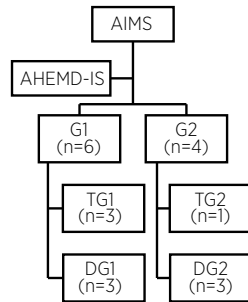


Figure 1. Flowchart of patients distribution.

AHEMD-IS: Affordances in the Home Environment for Motor Development - Infant Scale; AIMS: Alberta Infant Motor Scale; G1: group 1; TG1: toy group 1; DG1: dog group 1; G2: group 2; TG2: toy group 2; DG2: dog group 2.

The evaluator's comments for the AIMS scores along with the participants' neuromotor changes provided information on the infants' strengths and weaknesses, enabling the intervention strategies planning for each group.

The ten infants included in the study were subdivided into groups based on the evaluations and presented difficulties, according to their initial clinical diagnosis, namely: socialization and motivation problems, rejection of the prone position, difficulties in cervical control, altered lower (LLs) and upper limbs (ULs) movements, and decreased overall muscle strength^{25,26}.

The AHEMD-IS questionnaire was applied after the AIMS on the evaluation day of each group and the former classified environments as: excellent, adequate, moderately adequate, and less than adequate.

The age range chosen in this study was 4-months-old because this age marks the beginning of the interest in grabbing objects, greater interaction with the environment, and neuroplasticity. Moreover, results found in other studies showed that children aged from four to 40 months establish eye contact with movies and animal figures^{5,19}.

All interventions took place in fortnightly sessions that lasted 90 minutes due to the availability of the coparticipant institution, *Medicção Brasil* ("Dogtor" Brazil). DG1 and DG2 had the presence of a dog as a stimulator for the intervention^{10,15,27}, and, regarding behavior and health, all animals were able to perform AAT. In TG1 and TG2, balls of different sizes, colors, and textures, sound and luminous balls, as well as rubber colored books were used^{1,10}.

Data were collected from January to July, 2020. For data analysis, participants' videos and photos, observations, and the evaluator's notes were used^{10,16}.

RESULTS

Infants of both sexes participated in the study, predominantly boys. Below, we describe the activities according to the intervention established for each group.

Toy Groups

For TG1, the first activity sought to create an initial bond between therapist and participants, and to perform visual and hearing stimulation, as well as cervical control stimulation in supine, prone, and sitting with support positions. For this first activity, we used sound and luminous spiky balls as well as colored rubber books as shown in Figure 2. The toy was in front of the participant in the position chosen for cervical stimulation and the therapist encouraged them to play.

The only TG2 girl participant performed the same activity on the first day with TG1, so, in addition to motor stimulations, she could improve her socialization as well. Moreover, her intervention emphasized touch stimulation and grabbing objects with the right upper limb, according to the necessity observed in her evaluation.

The toys aroused the participants' interest, who showed alternating limb movements, little agitation, and little eye contact, but presented greater interaction with toys that had more than one color and/or those with sound. Moreover, the infants did not remain in the prone position and did not produce sounds. Regarding the TG2 girl participant, besides presenting the same behavior as TG1 members, she also reached and grabbed objects with the movement of upper limbs.



Figure 2. Toy Group Activity 1

Dog Groups

In the groups with dog-assisted therapy, infants established a first contact with the dogs, and socialization occurred in a fun way. In the first session, animals were in front of the participants in the position chosen to stimulate cervical control in the supine, prone, and sitting

with support positions. The therapist and examiners encouraged the infant's contact with the dog.

The second session sought to stimulate the crawling and roll over movements, using the dog as the motivator for the movements (Figure 3). The animal was in front of the infant and the therapist offered help with motor stimulation.



Figure 3. Dog Group Activity 2

The third activity proposed was motor stimulation by sitting with the support of colored inflatable floats and dog motivation. At first, the animal was in front of the infant and then on their right and left for lateral

stimuli (Figure 4). In the beginning, the mother help was requested. However, throughout the activity, the mother's help became less necessary due to the confidence the infants showed.



Figure 4. Dog Group Activity 3

The animals' presence in the activities provided: infants interested in touching, imprecisely reach, eye contact, smiles, alternating limb movements, sound production, motivation and security to perform the proposed activities, better interaction, and a fun and suitable environment for the participants. Most infants did not perform the final crawl-and-roll-over movement, but we observed the effort to perform and focus on the animal. Also, the infants evolved the sit with support stimulus throughout the session.

DISCUSSION

In this study, we filmed and photographed the therapeutic activities of each infant, a method also chosen by Thodberg, Berget, and Lindfors¹⁴ as well as Elmacı and Cevizci⁸.

Silva, Castro-Silva, and Moura¹⁵ and Sim et al.²⁸ suggest that the number of subjects in qualitative studies has great variation, ranging from two to 60 participants. In this study, the sample consisted of 10 infants, the same number of patients used by Elmacı and Cevizci⁸ and infants in each group in Kil et al.'s study²⁵.

Initiating an early evaluation and treatment, as in this study, is extremely important. Buftac et al.⁶ showed that children who did not walk and did not undergo early intervention and monitoring had 11 times more contractures, which is a very negative result for these patients' quality of life.

We chose AIMS for this study because it is a dynamic evaluation tool in which children have the opportunity of independently and spontaneously showing their achievements. Moreover, this scale is used in the literature and indicated for the screening of infants at risk of developing neuropsychomotor developmental delay (NPMD)²³. Regarding the assessment of the home environment, we chose the AHEMD-IS questionnaire to ensure that the results of the environment interfered as little as possible in the results of the infants' motor performance. In this study, we found no relationship between motor performance and home environment opportunities.

During all activities, the guardians were present so that infants felt safer and more comfortable and parents could know the NPMD of their children. Román-Oyola et al.² suggest that motivation to play is important to improve parents' sense of self-efficacy in their relationship with their children.

Regarding the choice of types of intervention, the study had the role of creating facilitating conditions in order to achieve the goals by the use of toys and AAT,

corroborating the study by King⁵. The learning experiences lived included new behaviors and learnings, as well as activities relevant to each type of neuromotor alteration.

Silva et al.²³ stated that physical therapy with toys creates opportunities for adequate and essential situations for children. The most colorful toys and those with sound presented the best interaction results. In the study by Costa et al.¹, the playful resources associated with respiratory physical therapy in a hospital were important to improve the interaction of physical therapists with their patients. Schivinski et al.³ stated that the use of blow toys also motivated the children.

Fosco et al.²⁶, who chose several toys and the dog as well, also compared the use of toys with AAT in physical therapeutic sessions. In AAT activities, the authors defined specific goals to improve head and trunk control and balance in different positions with the animal, whereas in the called conventional physical therapy activities they used sound toys, balls, and colored objects.

With regard to AAT, this type of therapy involves multisensory methods that can result in behavior changes. Firmin et al.¹² stated positive behavior created by the presence of animals, corroborating this study outcomes. In Hediger et al.'s¹⁰ study, patients hospitalized in a minimally conscious state showed more behavioral reactions in the presence of an animal, confirming the result found in our study, in which infants from groups DG1 and DG2 showed more alternating limb movements.

Regarding the motivation for motor skills, the changes observed before and after the therapy sessions with therapy dogs were similar to those of previous studies^{10,14,15}. As a complement, Nedzinskaitė et al.¹³ stated that, in addition to working as performance motivators, dogs assist in several tasks, reducing tension and anxiety, as noted in DG1 and DG2 activities.

Hediger and Turner's²⁴ study suggest that dogs can improve group activities, outcome similar to our findings regarding socialization in the proposed activities. In Kil et al.'s²⁵ study, the authors found that AAT, added to group therapy and playful therapies, is an effective treatment to increase cognitive functions, as stated in our study with infants.

In another study, the positive rehabilitation of patients who underwent animal therapy, proactive approach of dogs, and reciprocity between therapists and patients¹³ were stated as relevant results. Moreover, Nobre et al.²⁷ and Lundqvist et al.⁷ showed the benefits AAT provides to patients, presenting its contribution to socialization, affectivity, relaxation, global motricity, attention, focus,

and interest in the environment. Fung⁹ also stated a relaxed environment that promotes feelings of joy and relaxation, such as in our study. A facilitating and happy environment offers physical, cognitive, and social advantages, that is, dog-assisted therapy influences an individual's development in a comprehensive and global manner.

The results of this study suggest that the use of dogs in physical therapy may be an option for rehabilitation of infants with neuropsychomotor developmental delay.

CONCLUSION

The presence of a dog promoted better results regarding touch interest, visual contact, sound production, motivation and security for the conduction and improvement of motor skills, better social interaction, and creation of a relaxed and cheerful environment. ATT can be an efficient method to aid conventional therapy in physical therapy sessions of infants with neuromotor developmental delay.

Further studies with larger samples, other age ranges, and more frequent activities should be carried out to increase scientific evidence on the use of dogs for physical therapy rehabilitation of infants with neuromotor delay.

REFERENCES

- Costa EF, Mansour NR, Valentini EA, Silva CCR. Recursos lúdicos aplicados na clínica pediátrica do Hospital Municipal de Foz do Iguaçu-PR. *Conscientiae Saude*. 2015;14(1):125-33. doi: 10.5585/consaude.v14n1.5365.
- Román-Oyola R, Figueroa-Feliciano V, Torres-Martínez Y, Torres-Vélez J, Encarnación-Pizarro K, Fragoso-Pagán S, et al. Play, playfulness, and self-efficacy: parental experiences with children on the autism spectrum. *Occup Ther Int*. 2018;2018:4636780. doi: 10.1155/2018/4636780.
- Schivinski CIS, Manna BC, Belém FJM, Castilho T. Therapeutic blowing toys: does the overlap of ventilatory stimuli alter the respiratory mechanics of healthy schoolchildren? *Rev Paul Pediatr*. 2020;38:e2018259. doi: 10.1590/1984-0462/2020/38/2018259.
- Lobo MA, Harbourne RT, Dusing SC, McCoy SW. Grounding early intervention: physical therapy cannot just be about motor skills anymore. *Phys Ther*. 2013;93(1):94-103. doi: 10.2522/ptj.20120158.
- King G. The role of the therapist in therapeutic change: how knowledge from mental health can inform pediatric rehabilitation. *Phys Occup Ther Pediatr*. 2017;37(2):121-38. doi: 10.1080/01942638.2016.1185508.
- Buftac EG, Andersen GL, Spinei L, Jahnsen RB. Early intervention and follow-up programs among children with cerebral palsy in Moldova: potential impact on impairments? *BMC Pediatr*. 2020;20(1):29. doi: 10.1186/s12887-020-1931-7.
- Lundqvist M, Carlsson P, Sjö Dahl R, Theodorsson E, Levin LÅ. Patient benefit of dog-assisted interventions in health care: a systematic review. *BMC Complement Altern Med*. 2017;17(1):358. doi: 10.1186/s12906-017-1844-7.
- Elmaci DT, Cevizci S. Dog-assisted therapies and activities in rehabilitation of children with cerebral palsy and physical and mental disabilities. *Int J Environ Res Public Health*. 2015;12(5):5046-60. doi: 10.3390/ijerph120505046.
- Fung SC. Effect of a canine-assisted read aloud intervention on reading ability and physiological response: a pilot study. *Animals (Basel)*. 2019;9(8):474. doi: 10.3390/ani9080474.
- Hediger K, Petignat M, Marti R, Hund-Georgiadis M. Animal-assisted therapy for patients in a minimally conscious state: a randomized two treatment multi-period crossover trial. *PLoS One*. 2019;14(10):e0222846. doi: 10.1371/journal.pone.0222846.
- Machová K, Procházková R, Říha M, Svobodová I. The effect of animal-assisted therapy on the state of patients' health after a stroke: a pilot study. *Int J Environ Res Public Health*. 2019;16(18):3272. doi: 10.3390/ijerph16183272.
- Firmin MW, Brink JE, Firmin RL, Grigsby ME, Trudel JF. Qualitative perspectives of an animal-assisted therapy program. *Altern Complement Ther*. 2016;22(5):204-13. doi: 10.1089/act.2016.29073.mwf.
- Nedzinskaitė U, Mažeikaitė J, Paleckaitis M, Stankevičius R. Canine-assisted therapy and the improvement of physical characteristics in disabled children: a pilot study. *Sveik Moksl*. 2019;29(6):88-94. doi: 10.35988/sm-hs.2019.106.
- Thodberg K, Berget B, Lindfors L. Research in the use of animals as a treatment for humans. *Anim Front*. 2014;4(3):43-8. doi: 10.2527/af.2014-0021.
- Silva A, Castro-Silva CR, Moura L. Pesquisa qualitativa em saúde: percursos e percalços da formação para pesquisadores iniciantes. *Saude Soc*. 2018;27(2):632-45. doi: 10.1590/S0104-12902018172700.
- Patias ND, Von Hohendorff J. Critérios de qualidade para artigos de pesquisa qualitativa. *Psicol Estud*. 2019;24:e43536. doi: 10.4025/psicoestud.v24i0.43536.
- Lobue V, Pickard MB, Sherman K, Axford C, DeLoache JS. Young children's interest in live animals. *Br J Dev Psychol*. 2013;31(Pt 1):57-69. doi: 10.1111/j.2044-835X.2012.02078.x.
- O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. *Acad Med*. 2014;89(9):1245-51. doi: 10.1097/ACM.0000000000000388.
- Pereira KRG, Saccani R, Valentini NC. Cognição e ambiente são preditores do desenvolvimento motor de bebês ao longo do tempo. *Fisioter Pesqui*. 2016;23(1):59-67. doi: 10.1590/1809-2950/14685223012016.
- Santos LR, Barbosa E, Braga SEM, Moussa L, Mendes MRP. Avaliação do desenvolvimento neuropsicomotor por meio da Escala Motora Infantil Alberta e a sua importância na intervenção precoce: uma revisão de literatura. *Rev Pesqui Acao*. 2017;3(2):36-45.
- Barros RS, Souza KM, Paiva GS, Silva EG, Silva DC, Mello CMS, et al. Principais instrumentos para avaliação do desenvolvimento neuropsicomotor em crianças no Brasil. *Braz J Dev*. 2020;6(8):60393-406. doi: 10.34117/bjdv6n8-451.

22. Caçola PM, Gabbard C, Montebelo MIL, Santos DCC. The new affordances in the home environment for motor development – infant scale (AHEMD-IS): versions in English and Portuguese languages. *Braz J Phys Ther.* 2015;19(6):507-25. doi: 10.1590/bjpt-rbf.2014.0112.
23. Silva WR, Lisboa T, Ferrari EP, Freitas KTD, Cardoso FL, Motta NFA, et al. Opportunities for motor stimulation in the home environment of children. *J Hum Growth Dev.* 2017;27(1):84-90. doi: 10.7322/jhgd.127659.
24. Hediger K, Turner DC. Can dogs increase children's attention and concentration performance? A randomised performance trial. *Hum Anim Interact Bull.* 2014;2(2):21-39.
25. Kil T, Yoon KA, Ryu H, Kim M. Effect of group integrated intervention program combined animal-assisted therapy and integrated elderly play therapy on live alone elderly. *J Anim Sci Technol.* 2019;61(6):379-87. doi: 10.5187/jast.2019.61.6.379.
26. Fosco MM, Ribeiro PR, Ferraz FHA, Freitas R Jr, Martin DW, Raymundo CS, et al. Aplicação da terapia assistida (TAA) por animais no tratamento de crianças portadoras de paralisia cerebral – TAA – Parte I. *Saude Colet.* 2009;6(32):174-80.
27. Nobre MO, Krug FDM, Capella SO, Ribeiro VP, Nogueira MTD, Canielles C, et al. Projeto pet terapia: intervenções assistidas por animais: uma prática para o benefício da saúde e educação humana. *Expressa Extensao.* 2017;22(1):78-89. doi: 10.15210/EE.V22I1.10921.
28. Sim J, Saunders B, Waterfield J, Kingstone T. Can sample size in qualitative research be determined a priori? *Int J Soc Res Methodol.* 2018;21(5):619-34. doi: 10.1080/13645579.2018.1454643.