

THE EFFECT OF HOME EXERCISE PROGRAM ON MOTOR DEVELOPMENTAL DELAY AND PARENTAL SATISFACTION

EV EGZERSİZ PROGRAMININ MOTOR GELİŞİM GERİLİĞİNE VE EBEVEYN MEMNUNİYETİNE ETKİSİ

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ABSTRACT

Objectives: The aim of this study is to investigate the effect of Home Exercise Program (HEP) on motor developmental retardation and to what extent parents will be satisfied with this model in children aged 0-2 who have motor developmental delay and are not currently included in a rehabilitation program.

Materials and Methods: We prepared case-specific home programs for the cases who applied to our outpatient clinic. We asked their parents to apply the HEP was given for their child in 3 sessions a day for 8 weeks. Motor development status was evaluated with the Alberta Infant Motor Scale (AIMS). Satisfaction of the parents with the service they received was evaluated with the Patient Satisfaction Questionnaire for the Physical Therapy Polyclinics.

Results: There were improvements in all sub-parameters of AIMS after HEP. These improvements were also statistically significant ($p=0.001$). While the satisfaction rate of parents with their relationships with physiotherapists is 88.4%, the rate of satisfaction with their relationships with physicians is 82.8%. The factors with the lowest satisfaction rates are physical comfort (61.6%) and technical quality (61.8%), and 88.0% of the parents stated that they would prefer the hospital again, while 86.7% stated that they would recommend it to their relatives.

Conclusion: HEP can be a savior in cases such as not leaving the baby without treatment until the physiotherapy program starts, initiating early intervention, families residing far from any health institution, and the pandemic process we have experienced soon, and parents are also satisfied with the HEP model.

Keywords: Developmental Delay, Home Exercise Program, Motor Development, Parental Satisfaction

ÖZET

Amaç: Bu çalışmanın amacı, Ev Egzersiz Programının (HEP) motor gelişim geriliği olan ve henüz bir rehabilitasyon programına dahil edilmemiş 0-2 yaş arası çocuklarda motor gelişim geriliği üzerine etkisini ve ebeveynlerin bu modelden ne ölçüde memnun kalacağını araştırmaktır.

Gereç ve Yöntem: Polikliniğimize başvuran her olguya özel HEP hazırladık ve ebeveynlerinden 8 hafta boyunca çocuklarına verilen HEP'i günde 3 seans halinde uygulamalarını istedik. Olguların motor gelişimi Alberta İnfant Motor Skalası (AIMS) ile değerlendirildi. Ebeveynlerin aldıkları hizmetten memnuniyetleri ise Fizik Tedavi Poliklinikleri Hasta Memnuniyet Anketi ile değerlendirildi.

Bulgular: HEP sonrası AIMS'in tüm alt parametrelerinde iyileşmeler görüldü. Bu gelişmeler istatistiksel olarak da anlamlıydı ($p=0,001$). Ebeveynlerin fizyoterapistlerle olan ilişkilerinden memnuniyet oranı %88,4 iken, hekimlerle olan ilişkilerinden memnuniyet oranı %82,8 idi. Memnuniyet oranının en düşük olduğu faktörler ise fiziksel konfor (%61,6) ve teknik kalite (%61,8) olup ebeveynlerin %88,0'i hastaneyi tekrar tercih edeceğini, %86,7'si ise yakınlarına tavsiye edeceğini belirtmiştir.

Sonuç: Bebeğin fizyoterapi programı başlayana kadar tedavisiz bırakılmaması, erken müdahaleye başlanması, ailelerin herhangi bir sağlık kuruluşundan uzakta ikamet etmesi, kısa bir süre önce yaşadığımız pandemi süreci gibi durumlarda ebeveynlerin de memnun olduğu HEP modeli kurtarıcı olabilir.

Anahtar Kelimeler: Ebeveyn Memnuniyeti, Ev Egzersiz Programı, Gelişim Geriliği, Motor Gelişim.

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INTRODUCTION

Rehabilitation in pediatric patients is traditionally carried out by physiotherapists in hospitals, branch centers, or special education centers after a physician's diagnosis. The implementation of the rehabilitation program in a health institution by a specialist is the most basic advantage of this system. In addition, this system brings with it various difficulties. Factors such as going to health institutions with a baby, carrying the baby's belongings, feeding the baby outside the home and meet other care needs, being affected by adverse weather conditions, and the need for care of other children of the family, if any, are the most common problems faced by parents. When the pandemic conditions we are in are added to all these problems, it is a serious burden for parents to suffer these problems for the 45-minute rehabilitation program (Park and Nam, 2019).

Another problem in the current system is that children who have not been diagnosed yet, but who are certain to have motor developmental delay, remain untreated until the rehabilitation program is started. Performing the necessary tests for the diagnosis, interdisciplinary consultation processes, and often waiting in line to be included in the rehabilitation program after the diagnosis causes the child with motor developmental delay and whose treatment should be started promptly, wasted valuable time (Harding et al., 2013).

When the child is included in the rehabilitation program after examination, consultation, and waiting in line, he receives treatment in 45-minute single sessions a day, 1-5 days a week. However, this frequency is very insufficient for the intensive program that needs to be applied in order to ensure normal motor development. That's why physiotherapists give parents a home program. In other words, even if the child receives treatment in a health institution, a Home Exercise Program (HEP) will still be needed (Taylor et al., 2004). Considering all these problems and the importance of starting rehabilitation in the early period, a new model is needed in order to protect the families from the constant commuting to the health institution, to protect the children from wasting time until the rehabilitation process begins, to protect them from the risks during the pandemic process, and to save the health institutions from the overload of patients (Morgan et al., 2016).

Families play a critical role in providing enriched experiences to support their young children's development. Family-centered care is a model that emphasizes the impact of the family on the health and development of their children and is the standard of care in early intervention and pediatric rehabilitation (Bamm and Rosenbaum, 2008; King and Williams, 2017).

The aim of this study is to investigate the effect of HEP on motor developmental retardation and to what extent parents will be satisfied with this model in children aged 0-2 who have motor developmental delay and are not currently included in a rehabilitation program.

MATERIALS AND METHODS

Participation in this study, which we conducted at Pamukkale University, Health, Application and Research Center Child Neurology Outpatient Clinic between December 2021 and August 2022, was based on volunteerism. Written informed consent was obtained from the parents of the cases and the Declaration of Helsinki was followed throughout the study. The ethical compliance of the study was approved by the Medical Ethics Committee of Pamukkale University on 28.12.2021 with the number E-60116787-020-149471.

Study design and participants

In the multidisciplinary working order we have established at the Pamukkale University of Health, Application and Research Center, Pediatric Neurology Outpatient Clinic, the necessary examinations are carried out by the pediatric neurology specialist of our team which consisted of two pediatric physiotherapists and a pediatric neurologist. Cases in need of physiotherapy evaluation and rehabilitation are also consulted by our team's physiotherapists specialized in pediatric rehabilitation. As a result of the physiotherapy consultation, the cases are either directed to be included into a HEP under the control of our polyclinic.

Our inclusion criteria for this study, were that the participants were between the ages of 0-2, had motor development retardation for any reason, and did not attend any physiotherapy and rehabilitation program. We prepared case-specific home programs for the cases who applied to our outpatient clinic and meet the inclusion criteria. We asked their parents to apply the HEP was given for their child in 3 sessions a day for 8 weeks. After the program started, parents were asked to bring the child to the hospital

every 2 weeks and the program was updated according to the child's needs. Before and after the HEP, the child's motor development status was evaluated with the Alberta Infant Motor Scale and the effect of the program on the child's motor development was determined. When the whole process was completed, the satisfaction of the parents with the service they received was evaluated with the Patient Satisfaction Questionnaire for the Physical Therapy Polyclinics.

Although HEPs are specially prepared according to the needs of the cases, in general within the framework of Bobath Therapy principles; such as tone regulating exercises, muscle strengthening exercises, proprioceptive training, vestibular stimulation exercises, tactile stimulation practices, sensory-perception-motor integrity exercises, gross motor development stimulation exercises such as crawling-standing-walking, and fine motor development exercises provided that agonist-antagonist strength is provided consists of applications.

Alberta infant motor scale (AIMS)

Among the assessment tools used to follow the changes in motor development and to distinguish atypical motor behaviors, AIMS is used as a valid and reliable tool to evaluate risky babies, and it shows the unique characteristics of preterm babies. It is an observational test developed to document change over time in infants at risk for the motor dysfunction. It is a norm-referenced scale that evaluates the gross motor development of 0-18 month-old infants. It includes 4 subscales consisting of 58 items: a) prone, b) supine, c) sitting, d) standing. All items of AIMS include variations such as weight-bearing, postural alignment and antigravity movements. The subscales are then summed for the total score (range 0-58) and converted to age-based percentile values. Scores at or below the fifth percentile are classified as abnormal. It requires minimal contact and is completed in 10-20 minutes. AIMS is used as a benchmark measure of delayed motor performance at 6, 9, and 12 months because of its excellent normative data, and has been shown to have predictive validity at 4 and 8 months to identify infants who will show poor neuromotor results earlier and at 18 months. It is a norm-referenced assessment of gross motor development with excellent psychometry and a widely used assessment battery in studies of very preterm infants with good predictive validity for the neurodevelopmental outcome when evaluated at a corrected age of 12 months (Piper et al., 1994).

Patient satisfaction questionnaire for physical therapy outpatient clinics (PSQ)

PSQ is a questionnaire that measures the dimensions of communication, accessibility, physical conditions of the outpatient clinic, cleanliness and technical quality, which have effects on patient satisfaction (Tüzün et al., 2009). In the questionnaire consisting of 24 questions, all of the questions were expressed as affirmative sentences. Answers to questions; 4—strongly agree, 3—agree, 2—undecided, 1—disagree, 0—strongly disagree. In addition, two closed-ended questions are asked and these two questions are presented with three answer options (yes, no, undecided). Standardized scores between 0-100 are calculated for each factor and all criteria. In standardized scores, “0” represents the lowest level of satisfaction and “100” represents the highest level of satisfaction. The formula “total raw score x (100 / highest possible score on the criterion or sub-scale)” was used to calculate the standardized scores. The total score in patient satisfaction is equal to the sum of the scores obtained in the sub-parameters. There is a validity and reliability study of the test (Tüzün et al., 2009). Content of the questionnaire, factor 1 (technical quality) 5 questions “17, 18, 19, 20, 23”, factor 2 (communication with physiotherapist) 4 questions “14, 15, 16, 24”, factor 3 (physical comfort) 3 questions “7, 8, 9”, factor 4 (communication with secretary) 3 questions “4, 5, 6”, factor 5 (communication with doctor) 4 questions “10, 11, 12, 13”, factor 6 (accessibility) 3 question “1, 2, 3”, factor 7 (cleanliness) 2 questions “21, 22”.

Statistical analysis

As a result of the power analysis performed with the data obtained from similar studies in the literature, it was calculated that 90% power would be reached with 95% confidence when at least 68 cases were included in the study (Başaran et al., 2014). Statistical analyzes were performed using SPSS v25.0 software. Continuous variables were defined as mean \pm standard deviation, and categorical variables were defined as numbers and percentages. Paired Sample t-test was used to measure the change in the motor development status of the subjects after the HEP since the data were normally distributed. p value \leq 0.05 was considered statistically significant.

RESULTS

Seventy-five (F: 37, M: 38) with a mean age of 12.92 ± 6.37 months were included in the study. A comparison of the participants' AIMS scores before and after treatment and the difference between these scores is given in Table 1.

Table 1. AIMS scores and comparisons before and after treatment

AIMS		X±SD	t	df	p
Prone	Pre-HEP	13.21±6.44	11.819	74	0.001*
	Post-HEP	16.97±5.08			
Supin	Pre-HEP	6.41±2.69	9.532	74	0.001*
	Post-HEP	8.07±1.68			
Sitting	Pre-HEP	7.07±4.55	8.254	74	0.001*
	Post-HEP	9.23±3.74			
Gait	Pre-HEP	3.49±4.25	10.418	74	0.001*
	Post-HEP	7.00±6.10			
Total	Pre-HEP	30.19±16.60	20.691	74	0.001*
	Post-HEP	41.27±15.25			

X: Mean SD: Standard Deviation t: Test Statistics df: Degree of Freedom * $p < 0,05$ Paired Samples t Test

According to Table 1, there were improvements in all sub-parameters of AIMS after HEP. These improvements were also statistically significant ($p=0.001$).

Table 2 shows the level of satisfaction parents feel from the HEP process.

Table 2. Parents' satisfaction with the HEP process

PSQ	X±SD	Min	Max	%
Technical Quality	12.36±1.32	7	20	61.8
Communication with Physiotherapist	14.14±0.03	11	16	88.4
Physical Comfort	7.39±0.90	4	12	61.6
Communication with Secretary	8.10±0.80	5	12	67.5
Communication with Physician	13.24±1.2	10	16	82.8
Accessibility	8.39±0.93	5	12	69.9
Cleanliness	7.17±1.10	5	8	89.6
Total	70.79±6.55	57	89	73.7

X: Mean SD: Standard Deviation Min: Minimum Max: Maximum %: Percentage of Factor to Full Score

According to Table 2, while the satisfaction rate of parents with their relationships with physiotherapists is 88.4%, the rate of satisfaction with their relationships with physicians is 82.8%. The factors with the lowest satisfaction rates are physical comfort (61.6%) and technical quality (61.8%).

Table 3 shows the parents' wishes to choose the hospital again and recommend it to their relatives.

Table 3. Parents' willingness to choose the hospital again and recommend it to their relatives

PSQ (Additional Questions)		n (75)	%
Would you choose this hospital again?	Yes	66	88.0
	No	4	5.3
	Undecided	5	6.7
Would you recommend this hospital to your relatives?	Yes	65	86.7
	No	4	5.3
	Undecided	6	8.0

According to Table 3, 88% of the parents stated that they would prefer the hospital again, while 86.7% stated that they would recommend it to their relatives.

DISCUSSION

According to the results of our study, we found that the HEP specially planned for each child improved motor skills in children aged 0-2 years who had motor developmental delay and were not included in a rehabilitation program and that the parents were satisfied with this process.

Considering the AIMS scores before and after HEP, children's motor skills are improving with their unique HEP. Considering the sub-categories, there are significant improvements in all of the prone position, supine position, sitting and standing-gait skills compared to pre-HEP. There has been no area of motor development that HEP has not contributed to. In this case, HEP can be offered to any child at every motor development level if the child does/can not continue a rehabilitation program.

Tang et al. (2011) conducted a study on seventy children who were diagnosed with motor or global developmental delay (ages 6-48 months and mean developmental age 12.5 months) without defined etiology (including 45 males and 23 females). The outcomes included the comprehensive developmental inventory for infants and toddlers test and the pediatric evaluation of disability inventory. The results suggest that children diagnosed with developmental delay who receive the early intervention will show improvement in developmental domains such as cognition, language, motor, self help and social functions (Tang et al., 2011).

In pediatric rehabilitation, traditional intervention theories are generally impairment-focused and, like neurodevelopmental therapy, are based on the hierarchical and neuron maturation of motor control (DeGangi and Royeen, 1994; Mathiowetz and Haugen, 1994). These emphasize increasing movement efficiency and reinforcing movement strategies to increase participation in functional activities. In functional-based intervention, learning outcomes are addressed through a self-organized process of interaction between children, tasks and a learning environment based on dynamic systems theory (Kamm et al., 1990; Levac et al., 2009). Activity-focused motor intervention is one of the most mentioned functionally based approaches (Valvano, 2004). In this model, physiotherapists focus on activity-related goals based on a motor learning strategy. Repetition of structured practice and functional actions is organized to learn purposeful tasks. This type of task-specific therapy has recently been suggested to be used in routine neuromotor interventions (Hubbard et al., 2009). HEP provides more opportunities for education and practice of therapeutic goals at home like non-repetitive repetition, intense stimulus and function-oriented exercises. This might be the reason why the children participating in HEP showed more improvement in our study.

Training frequency is important for motor development (Taub et al., 1999). However, it is still unclear how often it is necessary for children to learn and practice functions. This seems to depend on many factors, such as the severity of the disability, the task to be learned, the environment, the child's learning capacity and the method used. In our study, the 8-week intervention using a weekly treatment program was sufficient to provide developmental benefits.

When we take a deep look at the satisfaction of the parents with the HEP process, we see that they are highly satisfied with the physiotherapists and physicians. During the process, the subjects that parents were least satisfied with were hospital parameters such as technical quality, physical comfort and accessibility. Again, making an appointment with the secretariat and making entry-exit procedures are also in this group. These results show that it is difficult for parents to go to and from a health institution, to deal with secretarial procedures and to spend time in a health institution in order to receive one session of treatment, as was the aim of our study. Moreover, we only called parents to the hospital once every 2 weeks during our study. Considering that this 8-week HEP we applied was applied as institutional therapy, this level of dissatisfaction would have increased even more.

Although the parents were not satisfied with the physical conditions of our hospital, they stated that they would highly prefer our hospital again and recommend it to their relatives. We interpreted this as the fact that the parents thought that the physical conditions of other hospitals were not different from ours and that they did not have a problem as long as they were satisfied with the treatment their children received and came to the health institution less frequently, as in our study. As a matter of fact, other studies in the literature show that parents of children with motor developmental delay are satisfied with the effectiveness of home exercise programs and visit health institutions less (Gibbard et al., 1993; Law and King, 1993; Love et al., 2005).

Cases that applied to our outpatient clinic and met the inclusion criteria were included in our study. Instead, a randomized controlled trial design could better measure the efficacy of HEP. We see this situation as the limitation of our study. The strength of our work is that it has brought a solution to the problems of today's institutional physiotherapy and rehabilitation practices with a multidisciplinary working environment.

CONSLUSION

In conclusion; HEP can be a savior in cases such as not leaving the baby without treatment until the physiotherapy program starts, initiating early intervention, families residing far from any health institution, and the pandemic process we have experienced soon. In such cases, besides being a problem solver, it will reduce the density of health institutions and alleviate the financial and moral burdens of families. The results of our study also show that parents are also satisfied with the HEP model. Today, when "remote control" has become so widespread, physiotherapy and rehabilitation should be applied in the form of HEP, provided that it is controlled by a physiotherapist at regular intervals when appropriate conditions arise.

Author Contributions

Plan, design: FT, FY; **Material, methods and data collection:** FT, FY, OG; **Data analysis and comments:** FT, FY, OG; **Writing and corrections:** FT, FY, OG.

Conflict of Interest

The authors declare no conflicts of interest.

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REFERENCES

- Bamm, E. L., Rosenbaum, P. (2008). Family-centered theory: origins, development, barriers, and supports to implementation in rehabilitation medicine. *Archives of Physical Medicine and Rehabilitation*, 89(8), 1618-1624.
- Başaran, A., Karadavut, K. I., Üneri, Ş. Ö., Balbaloğlu, Ö., Atasoy, N. (2014). Adherence to home exercise program among caregivers of children with cerebral palsy. *Turkish Journal of Physical Medicine & Rehabilitation/Turkiye Fiziksel Tip ve Rehabilitasyon Dergisi*, 60(2), 85-91.
- DeGangi, G. A., Royeen, C. B. (1994). Current practice among neurodevelopmental treatment association members. *The American Journal of Occupational Therapy*, 48(9), 803-809.
- Gibbard, D., Coglan, L., MacDonald, J. (2004). Cost-effectiveness analysis of current practice and parent intervention for children under 3 years presenting with expressive language delay. *International Journal of Language & Communication Disorders*, 39(2), 229-244.
- Harding, K. E., Leggat, S. G., Bowers, B., Stafford, M., Taylor, N. F. (2013). Reducing waiting time for community rehabilitation services: a controlled before-and-after trial. *Archives of Physical Medicine and Rehabilitation*, 94(1), 23-31.
- Hubbard, I. J., Parsons, M. W., Neilson, C., Carey, L. M. (2009). Task-specific training: evidence for and translation to clinical practice. *Occupational Therapy International*, 16(34), 175-189.
- Kamm, K., Thelen, E., Jensen, J. L. (1990). A dynamical systems approach to motor development. *Physical Therapy*, 70(12), 763-775.
- King, G., Williams, L., Hahn Goldberg, S. (2017). Family-oriented services in pediatric rehabilitation: A scoping review and framework to promote parent and family wellness. *Child: Care, Health and Development*, 43(3), 334-347.
- Law, M., King, G. (1993). Parent compliance with therapeutic interventions for children with cerebral palsy. *Developmental Medicine & Child Neurology*, 35(11), 983-990.
- Levac, D., Wishart, L., Missiuna, C., Wright, V. (2009). The application of motor learning strategies within functionally based interventions for children with neuromotor conditions. *Pediatric Physical Therapy*, 21(4), 345-355.

- Love, J. M., Kisker, E. E., Ross, C., Raikes, H., Constantine, J., Boller, K., ... Vogel, C. (2005). The effectiveness of early head start for 3-year-old children and their parents: lessons for policy and programs. *Developmental Psychology*, 41(6), 885.
- Mathiowetz, V., Haugen, J. B. (1994). Motor behavior research: implications for therapeutic approaches to central nervous system dysfunction. *The American Journal of Occupational Therapy*, 48(8), 733-745.
- Morgan, C., Novak, I., Dale, R. C., Guzzetta, A., Badawi, N. (2016). Single blind randomised controlled trial of GAME (Goals, Activity, Motor Enrichment) in infants at high risk of cerebral palsy. *Research in Developmental Disabilities*, 55, 256-267.
- Park, E. Y., Nam, S. J. (2019). Time burden of caring and depression among parents of individuals with cerebral palsy. *Disability and Rehabilitation*, 41(13), 1508-1513.
- Piper, M. C., Darrach, J., Maguire, T. O., Redfern, L. (1994). *Motor assessment of the developing infant (Vol. 1)*. Philadelphia: Saunders.
- Tang, M. H., Lin, C. K., Lin, W. H., Chen, C. H., Tsai, S. W., Chang, Y. Y. (2011). The effect of adding a home program to weekly institutional-based therapy for children with undefined developmental delay: a pilot randomized clinical trial. *Journal of the Chinese Medical Association*, 74(6), 259-266.
- Taub, E., Uswatte, G., Pidikiti, R. (1999). Constraint-induced movement therapy: a new family of techniques with broad application to physical rehabilitation-a clinical review. *Journal of Rehabilitation Research and Development*, 36(3), 237-251.
- Taylor, N. F., Dodd, K. J., McBurney, H., Graham, H. K. (2004). Factors influencing adherence to a home-based strength-training programme for young people with cerebral palsy. *Physiotherapy*, 90(2), 57-63.
- Tüzün, E. H., Eker, L., Daşkapan, A. (2009). Fizik tedavi poliklinikleri için hasta memnuniyet ölçeği: güvenilirliği ve geçerliği. *Fizyoterapi Rehabilitasyon*, 20(1), 09-16.
- Valvano, J., Rapport, M. J. (2006). Activity-focused motor interventions for infants and young children with neurological conditions. *Infants & Young Children*, 19(4), 292-307.