

Intervention in a Child with Cerebral Palsy Focusing on Real-Life Movements in Home-Visit Rehabilitation

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Abstract

This case report aimed to examine whether real-life activities of daily living (ADL) instruction in home-visit rehabilitation was effective in reducing the amount of ADL assistance for children with cerebral palsy (CP). The participant was a boy aged 13 years with CP. Interventions included movement instructions for dressing the upper body and washing during bathing. Instruction for dressing the upper body focused on learning to pass the upper extremity through the cuff. The therapist guided the upper extremity movements during washing. Later, with the emergence of spontaneous washing, it was modified to washing with the therapist's verbal instructions only. The mothers, who were the primary caregivers, were taught to perform each movement. The frequency of the intervention was once every 2 weeks with a duration of 60 min per intervention. Consequently, the dressing the upper body item of the Functional Independence Measure (FIM) improved from 2 points before the intervention to 5 points. The washing item of the FIM also improved from 2 to 4 points. In conclusion, it was suggested that real-life ADL instruction in home-visit rehabilitation may be effective in reducing the amount of ADL assistance for children with CP.

Keywords: cerebral palsy, real-life based on movement methods, home-visit rehabilitation, Activities of daily living.

INTRODUCTION

Cerebral palsy (CP) is a non-progressive neurological brain disorder that causes motor dysfunction [1] with increasing incidence [2]. In addition to neurological motor impairments, children with CP may have reduced mobility from school-age owing to secondary impairments such as scoliosis [3, 4], requiring assistance with activities of daily living (ADL) [5]. In addition, the increased burden of caring for children with reduced ADL capacity has a significant impact on the lives of not only children with CP but also on the lives of their family members who are caregivers [4]. Therefore, for improving the quality of life of children with CP and their families, measures to prevent and improve the deterioration of ADL abilities should be

adopted. In Japan, physical therapy for children with CP has traditionally been performed in residential facilities; however, currently, physical therapy interventions by home-visit rehabilitation are on the rise [6-8]. Furthermore, recently, the instructing of movement methods based on real-life through home-visit rehabilitation has been gaining attention as a measure to reduce the amount of assistance for ADL [9, 10]. Watanabe et al [9] reported that children with CP staying at home often desire to be instructed movement methods based on real-life, such as bathing and transfer, and that the instructing of movement methods based on real-life is important in home-visit rehabilitation of children with CP. Iwasaki et al [10] reported that they were involved in instructing

movement methods based on real-life such as bathtub transfer and indoor/outdoor mobility to children with CP living at home. However, these reports are limited to a survey of home-visit rehabilitation for children with CP, and the effect of the intervention on ADL instruction is not clear. Therefore, if the effectiveness of the ADL instruction intervention for children with CP is achieved, it would help us investigate measures to reduce the amount of ADL assistance in children with CP.

In this report, we tried to determine whether the instructing of movement methods based on real-life home-visit rehabilitation was effective in reducing the amount of ADL assistance for children with CP.

MATERIALS AND METHODS

Participant

The participant was a boy aged 13 years (height, 170 cm; weight, 45 kg). The diagnosis was CP (spastic type) [11], with bilateral body distribution [12] and level III of the gross motor function classification system [13] in severity. The participant attended a special-needs school. The participant also used outpatient rehabilitation twice a month, one each for physical and occupational therapy. Of both the parents, the main caregiver was the mother. Home-visit rehabilitation was initiated to reduce the amount of assistance provided by the mother. The mother complained of the increasing burden of providing care in dressing the upper body. As per ethical considerations, we explained this study and obtained written consent from the participant's family. Additionally, it was approved by the Ethics Committee of the Nanto City Home-Visit Nursing Station (approval number: 2020.NHS.08).

Method

In the initial physical therapy evaluation, muscle tone was 0 in both upper extremities (all directions of motion of the shoulder, elbow, and wrist joints) and 1 in both lower extremities (all directions of motion of the hip, knee, and ankle joints) on the Modified Ashworth Scale [14]. There was no joint range of motion limitation in either the upper or lower extremities. Turning and rising movements and sitting were independent. Standing up and holding a standing position were performed independently, grasping the handrails. In the standing posture, both hip joints were flexed, the knee joints were flexed/valgus, and the ankle joints

were valgus. Standing up from the floor was performed independently using support. Walking ability required moderate assistance using a Posture Control Walker with short leg braces with joints. Mobility in ADL was fully assisted by a custom-made wheelchair in the special-needs school and outdoors and was performed independently by crawling around the home. The Functional Independence Measure (FIM) [15] had 59 points for motor items (27 for self-care, 14 for elimination, 15 for transfer, and 3 for mobility) and 24 for cognitive items (4 each for comprehension and expression, 7 for social interaction, 6 for memory, and 3 for problem-solving), for a total score of 83 points. Dressing the lower body was at an independent level except for the application and removal of the short leg braces. With respect to dressing the upper body, undressing was performed independently; however, it was difficult to pull down the garment and pass the upper extremity through the cuff of the garment. Passing heads through the cuffs was common.

The instruction of ADL in this participant focused on dressing the upper body, which was an increasing burden of care for the mother. Instruction in dressing upper body focused on learning to pass the upper extremity through the cuff. A front-opening vest with different markings on the inside of the cuffs was prepared. The participant learned to pass the right upper extremity through the right cuff when the right landmark was visible and learned to pass the left upper extremity through the left cuff when the left side landmark was visible. Once the upper extremity could be threaded through the cuffs using a front-opening vest, the clothing was changed to a blazer. Finally, the cuffs were threaded through the upper extremities using a long t-shirt and simultaneously pulling the garment down. The therapist also instructed the mother to encourage the participant to pass their upper extremities through the cuffs while wearing the open-front clothing. Nine months after the intervention, the mother complained about the burden of caring for washing during bathing, and we added the intervention accordingly. In this participant, only the chest and lumbar area could be washed and the other areas required assistance. Therefore, during the early phase of the intervention, the therapist guided the movements of the upper extremities during washing. Following this, as the spontaneous washing movement appeared, we changed it to the movement with the therapist's verbal instructions. The therapist

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instructed the mother to guide the participant to perform the upper extremity movements of washing to the maximum extent possible and assist when required. The frequency of the intervention was once every 2 weeks with a duration of 60 min per intervention.

RESULTS

The results are illustrated in Table 1. Six months after the intervention, the FIM improved from 2 to 3 points, with the ability to pass the upper extremity through the left sleeve during dressing the upper body. After

12 months, the thoracic, upper extremities, abdomen, and both thighs could be washed and the FIM improved from 2 to 3 points. Dressing the upper body was improved from 3 to 4 points, allowing the upper extremities to pass through the cuffs on both sides. After 18 months, the FIM improved from 4 to 5 points with no assistance for full clothing during dressing the upper body. The FIM improved from 3 to 4 points, as the chest, both upper extremities, abdomen, both thighs, anterior aspect of the perineum, and laminae could be washed.

Table 1. Change in FIM after intervention

	Before Intervention	After 6 months	After 12 months	After 18 months
Washing item	2/7	2/7	3/7	4/7
Dressing the upper body item	2/7	3/7	4/7	5/7
Motor items	59/91	60/91	62/91	64/91
Cognitive items	24/35	24/35	24/35	24/35
Total	83/126	84/126	86/126	88/126

FIM: Functional Independence Measure

DISCUSSION

This case study reported that instructing real-life movement methods during home-visits was effective in reducing the amount of ADL assistance for children with CP. The each item of the FIM in this participant showed an improvement after the intervention (Table 1). Therefore, it is suggested that instructing ADL based on real-life may have contributed to reducing the amount of ADL assistance in this case.

In this participant, we instructed the movement methods for dressing the upper body and washing and attempted to reduce the amount of assistance by establishing each movement method. Home-visit rehabilitation is different from living in a hospital, in which daily living activities are practiced in a real-life environment [6]. The motor learning should practice a task similar to a target task in movement practice [16]. Repeating the ADL that can be performed in daily life leads to the acquisition of ADL abilities [17]. In this participant, the repeated practice of dressing and washing under the real-life environment in the home-visit rehabilitation assisted learning by the movement procedures in real life. The establishment of each movement procedure may have led to a reduction in the amount of assistance. In addition, the method of each movement was communicated to the mother, the main caregiver; therefore, the ADL movement practice in the home-visit rehabilitation could be reflected in real life effortlessly. Yamazaki et al [18] reported that repeating a successful experience by reducing the difficulty of the target action is effective

for the retention of the action. In the participant, the use of a vest with large cuffs and markings may have reduced the difficulty of passing the upper extremity through the cuffs during dressing the upper body, and the therapist guided the upper extremity during the washing, which may have reduced the difficulty of the task and helped the therapist to establish the movement methods.

The limitation of this report is that this participant was of school age, and the intervention was initiated when the secondary disorders began emerging. Therefore, whether early ADL movement guidance, such as preschool, is effective in reducing the amount of assistance must be investigated. Moreover, randomized controlled trials must be conducted with an increased number of cases for clarifying the effectiveness of ADL behavioral instruction.

CONCLUSIONS

This case study examined whether real-life ADL instruction in home-visit rehabilitation was effective in reducing the amount of ADL assistance for children with CP. Consequently, the amount of ADL assistance was reduced in this participant. In the future, it will be necessary to increase the number of cases and to verify whether instructing real-life movement methods to children with CP is effective in reducing the amount of ADL assistance.

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