

# Exercise Program Using a Digital Therapeutics in Infant with Congenital Muscular Torticollis

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## INTRODUCTION

- Congenital muscular torticollis (CMT) is a common congenital musculoskeletal problem with unilateral stiffness of the sternocleidomastoid muscle after birth. Most children with CMT have a favorable prognosis after early and appropriate physical therapy including stretching, and the total dosage of physical therapy is a key factor in symptom alleviation.
- In this study, we applied Digital Therapeutics (DTx), prescribed by a specialist, to CMT treatment. Our multiplatform app, "Aceso" DTx (ACESO-APP), used AI-driven skeleton-based motion analysis and body reconstruction. This study evaluated its effects on clinical improvement and exercise increase in home-based treatment.

## Case presentation

- This was a prospective, open-label, pilot study. Participants were randomly allocated to the standard educated (SE) group or digital therapeutics (DT) group.
- Participants were encouraged to engage in a 12-week home-based exercise program with conventional physical therapy in the hospital. A 12-week home-based and personalized physical therapy program was encouraged for each of the two groups through digital therapeutics or a standard education program.
- We measured changes in total torticollis overall assessment (TOA) and exercise amount at 4 weeks, 8 weeks, and 12 weeks. At 12 weeks, the usability and satisfaction of the digital therapeutics were also assessed with standard System Usability Scale (SUS).

## Results

- Fourteen participants were enrolled and randomized into DT (n=7) and SE (n=7) groups. Among 14 participants, two participants requested to discontinue the program because of difficulty in using the app and the medical condition of the infant, and four participants were lost to follow-up.
- In all participants, significant changes were observed in TOA at 12 weeks from a mean of 13.50 points (SD 2.88) to 16.13(SD 2.36; P=.010).

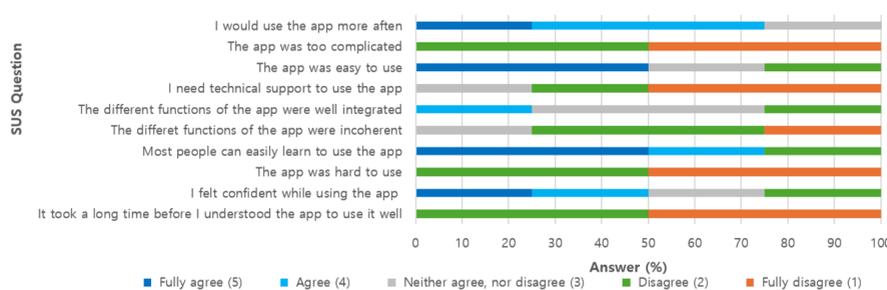
- There were no statistical differences in the changes of TOA score and exercise amount between the SE and DT groups. However, a statistical trend toward an increase in changes in TOA score and exercise amount in the DT group. (Table 1, Table 2)
- Concerning usability, an average SUS score of 73.13 was obtained, meaning it has a grade of "B", corresponding to good (Figure 3). For satisfaction according to a 7-point Likert-type scale, the highest score was observed for "interest" (5.25, SD 1.26), followed by "stability", "satisfaction", "role expectation for rehabilitation", "symptom improvement", "intention to use", and "adequate difficulty", "physical comfort". (Figure 1)

	DT group (points)		SE group (points)		P-value	
	Mean ± SD	Within-individual change	Mean ± SD	Within-individual change		
Baseline (T0)	12.50 ± 3.32		14.50 ± 2.38			
4 Weeks (T1)	14.50 ± 2.08	T1-T0	2.00 ± 2.83	15.00±2.16	T1-T0	1.25 ± 2.19
8 Weeks (T2)	15.50±1.73	T2-T0	3.00 ± 3.16	16.00±1.41	T2-T0	2.25 ± 2.38
12 Weeks (T3)	16.25±2.36	T3-T0	3.75 ± 3.20	16.00±2.71	T3-T0	2.63 ± 2.50

**Table 1. Baseline and Results Primary Outcome : Torticollis Overall Assessment Score**

	DT group			SE group			P value
	Frequency (number/week)	Duration (min/session)	Amount (min/week)	Frequency (number/week)	Duration (min/session)	Amount (min/week)	
4 Weeks (T1)	10.25 ± 3.35	38.13 ± 27.64	368.75 ± 352.00	7.50 ± 3.32	14.88 ± 13.54	128.38 ± 130.92	.343
8 Weeks (T2)	7.75 ± 4.57	20.00 ± 26.77	143.75 ± 185.98	10.25 ± 9.00	18.75 ± 13.15	106.25 ± 54.37	.686
12 Weeks (T3)	8.63 ± 6.21	19.00 ± 21.15	167.38 ± 164.66	8.00 ± 9.02	12.50 ± 11.90	60.00 ± 44.91	.486

**Table 2. Results for the Secondary Outcome : Exercise Amount**



**Figure 1. Scores in the SUS of ACESO-APP**

## CONCLUSION

- ACESO-APP is a practical, acceptable, promising exercise management program for children with CMT. The preliminary findings provide a good foundation for further optimization of exercise programs using DTx and the promotion of large-scale randomized controlled clinical studies for children with CMT. It may be an additional treatment option and possibly a viable alternative to conventional physical therapy.