



Effectiveness of mind simulation on stuttering in a patient with spastic diplegia: A case report

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Case Report

Abstract

BACKGROUND: Cerebral palsy (CP) is a non-progressive brain lesion that causes impaired muscle coordination. Diplegia is a type of limb paralysis that usually involves the symmetry organs, with the involvement of lower organs being more than the upper organs. Patients with diplegia have a type of secondary muscle tension dysphonia due to speech-breathing disorders and speech problems including stuttering. This study is conducted aiming to evaluate the effectiveness of the mind simulation method on improving stuttering in a patient with spastic diplegia.

CASE REPORT: The patient was an 11-year-old boy diagnosed with spastic diplegia with stuttering disorder and had long been treated with chlorsospasm and was selected by purposive sampling method. After 21 days of assessment in the baseline stage (A), he was treated with mind simulation (B) for 10 weeks. Evaluations were carried out every 10 days and totally, 7 evaluations were carried out. Data were analyzed in a reversal design through visual method, chart slope analysis, and comparison of subjects' mean performance at baseline and intervention stages using SPSS software.

CONCLUSION: The primary outcomes showed that the simulation method was associated with decreased stuttering in the patient ($P < 0.01$). The secondary outcomes showed decreasing scores of frequency indices, delay, movements of hand, head, face, body, mouth, and psychological factors in Stuttering Severity Instrument (SSI) ($P < 0.01$). The findings of this study indicated that the use of the mind simulation method as a complementary intervention could be associated with a decrease in stuttering symptoms in patients with spastic diplegia.

KEYWORDS: Cerebral Palsy; Spastic Diplegia; Stuttering

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Introduction

Cerebral palsy (CP) is a non-progressive brain injury that develops at birth or early childhood and causes various disorders in muscle coordination, maintaining normal posture, and motor actions. CP is a broad term that encompasses a number of clinical syndromes with neurological origin and various other causes.¹

CP in children is the most common physical disability that affects 3.3 of every 1,000 children in the United States. There are various classifications for the types of CP that are based on the organs involved. Accordingly, the number of organs involved is termed as monoplegia, hemiplegia, diplegia, quadriplegia or tetraplegia, triplegia, and paraplegia. In the type of diplegia, all the extremity organs (the legs more than the hands) are involved.²

On the other hand, language and balance in body movements form the basis of individual and social behaviors, and speech can be considered as an objective form of

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language that is a means of expressing the needs and desires. In patients with CP, speaking, psychological speech, communicating effectively, and communicating messages are associated with significant difficulties.³ Caring for children with CP is challenge for the family and this has a significant impact on their livelihoods. Therefore, the families of these patients are usually receptive to effective therapeutic interventions.

The mind simulation method is one of the new methods that have been developed in recent years to improve movement control and muscle coordination. Mind simulation is a mimic representation of a set of real or imagined events.⁴ This treatment helps people with stuttering and speech problems to gain a proper understanding of the nature and function of the mind and thus overcome their speech problems. This approach helps patients to be able to form or regenerate naturally mechanical and motor behaviors.

According to the guidelines of the mind simulation method,⁵ speech has an algorithm that guarantees a problem solution if used correctly. Based on the mind simulation model, people with stuttering cannot learn from looking at the speech of normal people and even from people who have high speech skills. Therefore, the reason for the failure of the existing therapies is their emphasis on the physical and mechanical aspects of speech. Therefore, the process of formation of speech skills needs to be reconstructed naturally. The efficacy of this therapy in increasing cognitive flexibility and reducing stress in people with stutterers has been reported.⁵

Accordingly, and given promising findings about the effectiveness of mind simulation on psychological parameters, the present study is conducted aiming to investigate the effectiveness of mind simulation on improving stuttering in a patient with spastic diplegia.

Case Report

We used a single-subject reversal AB design with multiple baselines that A was the baseline stage and B as the intervention stage. The patient was an 11-year-old boy with spastic CP who was referred to the Mind Enhancement Clinic for treatment of stuttering and hand and foot movements during January 3 to April 28, 2020. The patient was diagnosed with diplegia by a specialist physician based on the clinical records. The patient was referred to a pediatric neurologist in Tehran, Iran, after 7 years of chlorospasm consumption and no response to treatment who was diagnosed with CP and had been under medication, occupational therapy, and speech therapy since 1996. The subject's intelligence quotient (IQ) was moderate (90-110) and had no postural limb movements. After 21 days of assessment in the baseline stage (A), he was treated with mind simulation (B) for 10 weeks. He was evaluated every 10 days and a total of 7 evaluations were carried out on him. The therapeutic sessions were held for 10 one-hour sessions.

In this study, the Stuttering Severity Instrument (SSI), demographic checklist, and Structured Clinical Interview (SCID) were used. The SSI assesses stuttering in terms of frequency, delayed hand, foot, and body movements, psychological factors, head movement, tongue, mouth, lip, and breathing, reading, pressure, and utterance. Data were analyzed in a reversal design through visual method, chart slope analysis, and comparison of subjects' mean performance at baseline and intervention stages using the Statistical Package for the Social Sciences (SPSS) software (version 20, IBM Corporation, Armonk, NY, USA). All stages of the study were performed after obtaining written informed consent from the parents based on the Declaration of Helsinki (DoH).

The data of the present study were analyzed using visual analysis, chart slope analysis, and comparison of the subject's mean

performance in baseline and intervention stages. The distribution of the subject's scores on the stuttering severity index is presented in table 1.

Table 1. Distribution of the subjects' scores on the general stuttering severity scale

Stage	Level	Stuttering severity	Effect size
Baseline	Pretest 1	98	%100
	Pretest 2	100	
Intervention	Stage 1	88	
	Stage 2	86	
	Stage 3	75	
	Stage 4	69	
	Stage 5	55	

As shown in the findings in table 1, the mean score of stuttering severity at baseline was 99%, which decreased significantly during the intervention ($P < 0.01$). The effect size was calculated 100% using the non-coated effect size calculation method. The subject's scores were also found significant in the subscales of frequency, delay, reading, breathing, limb movement, psychological factors, and head, tongue, mouth, and lip movements on the SSI ($P < 0.01$ for all).

Discussion

This study was conducted aiming to evaluate the effectiveness of the mind simulation method on improving stuttering in a patient with spastic diplegia. The findings suggested that the simulation method was associated with decreased stuttering in frequency, delay, hand, head, face, body, and mouth movements, and psychological factors in the SSI. Stuttering has obvious and visible symptoms that are directly related to speech and language. In addition, stuttering can lead to secondary abnormal behaviors such as irregular movements of the head, various components of the face, hands, head, and even eye contact.³⁻⁵

The mind simulation model leads to the

formation of skill, movement, and modification of movements by rebuilding the underlying physical and mental processes.³ The mind simulation therapy helps the person to remove force and control from other parts and focus only on the larynx. This process requires switching from an automated behavioral plan to a conscious behavioral response. Medication and other physical methods such as surgery cannot make this change, because erroneous orders issued from the brain lead to the disorder needing correction. In fact, the simulation of the mind with the adaptation of programming models and the mind language follows this complex change. The person's gradual mastery over the various stages of the treatment process will eventually cause the person to be able to control the larynx.⁴

There were several limitations facing this study, with the first being the lack of possibility to review all the relevant literature. The number of publications in some way related to case reports and case series was enormous, however, we attempted to identify the publications relevant to our purpose.

Conclusion

The results of the present study showed that the use of the mind simulation method as a complementary intervention can be associated with a decrease in stuttering symptoms in a patient with spastic diplegia.

Conflict of Interests

Authors have no conflict of interests.

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