



The effects of narrative-based language intervention (NBLI) on spoken narrative structures in Persian-speaking cochlear implanted children: A prospective randomized control trial

Peyman Zamani^{a,b}, Zahra Soleymani^{a,*}, Shohreh Jalaie^c, Masoud Motasaddi Zarandy^d

^a Department of Speech Therapy, School of Rehabilitation, Tehran University of Medical Sciences, Tehran, Iran

^b Hearing and Speech Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

^c Departments of Physiotherapy, School of Rehabilitation, Tehran University of Medical Sciences, Tehran, Iran

^d Cochlear Implant Center and Department of Otorhinolaryngology, Amir Aalam Hospital, Tehran University of Medical Sciences, Tehran, Iran

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ABSTRACT

Background: Previous research has shown that narrative-based language intervention (NBLI) is a feasible approach increasing the narrative skills of hearing-impaired children.

Objective: In the present study, the efficacy of NBLI on the macrostructure and microstructure components of the spoken narrative of children with cochlear implants (CI) was evaluated in an experimental study.

Materials and methods: Thirty-six CI children between the ages of 5.5 and 7 years were randomly divided in three groups of equal size. Group 1 attended 24 1-h sessions of NBLI group therapy. Group 2 participants each attended 24 1-h private sessions of NBLI instruction. Group 3 attended 24 1-h conventional speech therapy (CST) sessions. The subjects' storytelling skills were prompted using pictures from the Persian version of the Language Sample Analysis test. The results were assessed before treatment (T0), after treatment (T1) and two months after treatment (T2) as follow-up.

Results: Groups 1 and 2 showed significantly better results over Group 3 on all microstructure components of spoken narrative at the T1 ($p \leq 0.04$) and T2 ($p \leq 0.04$) levels in comparison with T0, but no differences were observed between the NBLI approaches ($p > 0.05$). All three intervention programs significantly improved the macrostructure of the spoken narrative in CI children.

Conclusion: Improvements in spoken narrative structures were observed in CI children that support the efficacy of NBLI over CST for the hearing-impaired population.

1. Introduction

Narration, a type of discourse, is a higher language skill than simple sentences-telling in which narrators tell personal and fictional stories or explain about past, present or upcoming events. In most cases, a child's narrations are evaluated in a storytelling framework [1]. Narrative skill can represent a profile of the social communication and language skills of a child [2]. Narrative ability can predict a child's academic abilities and plays an important role in everyday verbal interaction [3]. Because narrative depends upon cognitive, linguistic and social integration, it can be considered to be a bridge between a child's emerging language development and social interaction skills [4].

A large number of variables have been used to evaluate the components of spoken narrative; however, a child's spoken narrative is generally assessed at the macrostructure and microstructure levels. At

the macro-level, stories are studied from their chronological and logical organizational perspectives, the observance of story grammar elements and the explicitness of the narrative [5]. At the micro-level, verbal productivity, grammatical complexity and the syntactic cohesion of the narrative are generally assessed [6]. Most children with language disorders have serious problems in narrative skills and clinicians have attempted to develop interventions to compensate and improve these problems. A variety of narrative-based intervention programs have promoted verbal language, improved the prerequisites for literacy skills and raised social competence for low-income preschoolers [7] and children with specific language impairments (SLI) [8], delayed language development [9], cerebral palsy [10] and autism spectrum disorders [11].

Three in every 1000 newborn Iranian infants are diagnosed with hearing impairments, more than half of whom were referred for

* Corresponding author.

E-mail address: soleymaniz@sina.tums.ac.ir (Z. Soleymani).

cochlear implants [12]. Evidence has shown that narrative is a vulnerable area in hearing-impaired children. Hearing-impaired children exhibit lower scores on spoken and written narrative tasks, content coherence, conjunctive cohesion, and morpho-syntactic elements than aged-matched peers with normal hearing [13]. A probable reason for narrative weakness is the sophisticated nature of spoken narrative. The acquisition of this skill requires general knowledge [14], adequate working memory and normal language development [2]. Often, hearing-impaired children have not received hearing aids or cochlear implants in a timely manner and have missed the critical period of hearing needed to achieve an abstract lexicon, meta-cognitive information and semantic inference [15]. Because spoken narrative is a complex and multi-dimensional skill, hearing-impaired children cannot be expected to attain high-level discourse or sophisticated narrative without direct intervention. Traditionally, language evaluation and intervention programs for hearing-impaired children (especially those with cochlear implants) have predominantly focused on reinforcement of early-developing language skills, such as specific language forms, unique vocabulary items, word-order rules, phonological training and subject-verb agreement [16]. A number of studies have reported that receptive and expressive vocabulary [17], mean length of utterances [18], morpho-syntactic complexity [19], auditory perception of speech [20] and speech intelligibility [21] in children with cochlear implants (CI) could be improved using traditional procedures. It can be said that CIs have had considerable positive influence on verbal language development and simple sentence production in deaf children that allows them to satisfactorily pass through the early-developing language period [6], yet they are inevitably classified as having delayed language [22]. They particularly experience delayed-discourse language [23].

Researchers now believe that children learn complex linguistic forms and pragmatic content during interactive-communicative situations with parents, caregivers and other children [1]. A similar perspective must be considered when training the discourse-language level of hearing-impaired children. Instead of focusing on the limited structures of sentences, it is more beneficial for therapists to emphasize authentic and pleasurable interactive programs for strengthening the spoken narrative skill of hearing-impaired children. Johnston [24] similarly believes that there are several reasons for considering narrative skills as intervention targets for all children with language disorders. These reasons are:

- a. Narratives can accurately reveal the details of a child's linguistic strengths and deficits;
- b. Narratives effectuate what a child takes away from contextualized speech to a decontextualized style of speech so that he can speak about abstruse and absent subjects;
- c. In comparison with single sentences or phrases, narrative is a powerful verbal communication form because it enables parents to connect with a child and transfer their own experiences to him;
- d. Narrative or storytelling can help a child improve active listening;
- e. Possessing a narrative ability by kindergarten is a good predictor of reading comprehension and literacy skills in the elementary grades.

Narrative-based language intervention (NBLI) is a well-known method for improving the discourse-language level. Because of its extensive flexibility, NBLI can be utilized in group therapy or individual delivery for preschool and school-age children [11]. Using a multiple baseline research design, Tyler and Sandoval [25] compared the effects of the following treatment conditions on six preschoolers: (a) phonological intervention; (b) narrative intervention; (c) combined intervention using both treatments on the microstructures of expressive language. The individually-delivered sessions were conducted three times a week for 12 weeks. The findings showed that the mean length of utterance (MLU) of spontaneous speech increased in all but two participants. These two were assigned to the narrative intervention group did not show considerable improvement in the morpho-syntactic

components of connected speech.

Klecan-Aker et al. [26] used a randomized control trial to investigate the efficacy of individually-delivered NBLI on story grammar and the syntactic complexity of spoken narrative in children with language impairments. They found that individually-delivered NBLI had a significant effect on the narrative skill of the children. Hayward and Schneider [27] used a pre-post test AB design without a control group to carry out the group therapy framework of NBLI (2 or 3 person groups in two 20-min sessions per week for 4–6 weeks) to improve the macrostructure and microstructure components of spoken narrative of 13 preschool language-impaired children. Their increase in the use of story grammar and episodes of spoken narrative demonstrated a statistically significant difference in the macrostructures from pretest to post-test. Davies et al. [9] evaluated 31 preschoolers with language delays on their spoken narrative abilities after 8 weeks of narrative intervention in a small group therapy format without a control group. The results revealed meaningful differences between all pre- and post-test outcomes for both macrostructure and microstructure components.

As noted, previous studies have revealed that NBLI is an effective approach to increasing the narrative skills of children with language disorders such as autism and SLI. These studies, however, investigated the effects of NBLI on narrative skill acquisition only on a few hearing-impaired children without a control group [28–30]. All of these researchers reported that story retelling ability in a book-reading mediated setting using conjunctions such as *and*, *but*, *or*, *because* and shifting from sign language to oral speech may be increased by NBLI. Justice et al. [31] used NBLI with acoustic highlighting of syntactic goals for three CI children to investigate the feasibility of NBLI for hearing-impaired children. They concluded that NBLI is a practicable approach for children with hearing impairments and can be considered to be a good approach to promoting their discourse-language level. They also suggested that further studies are needed to investigate the effects of NBLI on narrative structures and establish its efficacy and the effectiveness on hearing-impaired children. These studies have not tendered their own intensity and dosage of intervention and did not use a randomized controlled trial research method. To the best of our knowledge, there is no evidence about the quality and group size of the group therapy form compared with individually-delivered NBLI for hearing-impaired children and those with other disorders causing language impairment. The current study aimed to measure the efficacy of two types of NBLI (group therapy and individual delivery) compared to conventional speech therapy (CST) for improving the macrostructure and microstructure components of spoken narrative in Persian-speaking children with cochlear implants.

2. Methods and materials

2.1. Participants and ethical considerations

The subjects were selected from three cochlear implantation and auditory-verbal rehabilitation centers (Amir-Alam Hospital, Pedjvak Center, Loghman Hospital) in the city of Tehran, Iran. A total of 36 CI children (17 boys and 19 girls) with a mean \pm SD age of 72.3 ± 5.1 months and a mean \pm SD hearing age of 54.9 ± 10.1 months qualified for primary criteria evaluation of cognitive-linguistic skills and spoken narrative ability. The current study was a randomized control trial and is registered with the Iranian Registry of Clinical Trials (www.irct.ir, Registration ID in IRCT: IRCT201704247657N3).

2.1.1. Inclusion and exclusion criteria

The children who were eligible for the study were pre-lingually severely to profoundly deaf and had received unilateral 22-channel Nucleus cochlear implants before the age of 4 years. They and their families spoke Persian as their preferred language. All CI children had attended speech therapy sessions for at least 12 months (14.2 ± 1.8 months) before they participated in the study. Thus, they were able to

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