



## Case Report

# Investigation of Speech Impairments in A Child with HIV: The Study of Phonological Processes: Case Report

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### ABSTRACT

Human immunodeficiency virus (HIV) is a viral disease with immunodeficiency in human. So, it can involve different areas such as language, speech, motor and memory. The present research, as a case report, introducing the characteristics of phonological processes of a child who had Aids and lived in a nursery through referring and professional assessing in a speech therapy clinic. The child was a 4 year old boy who was in HIV base on blood test. Speech skills was assessed based on DEAP and language assessment was analyzed according to TOLD-P3. He talked with single word. He used two words sentences rarely. According to language assessment (TOLD-P3), semantic, syntax and phonology features were tested. So he was in emerging language stage. Also his expressive language was lower than his perceive language. In addition, based on DEAP-P test, phonological process of substitution type has been recognized most. Also, the most of the substitution phonological process which accrued have been velar fronting. This study showed that the most phonological process in a child with HIV was the process of substitution. It may be a risk factor for decreasing speech intelligibility. With regard to the results of the present research that showed that the subject had the disorder and there are limited researches in this area, it needs more surveys to help therapists to make a priority in therapeutic stages.

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### Introduction

Human immunodeficiency virus (HIV) is a neurodevelopmental infection and Immunodeficiency disease among humans [1]. Medically, the causative agent is a kind of retrovirus which belongs to RNA-VIRUS [2]. Also, it causes impairment of lymphocyte such as CD4 lymphocyte [3]. Due to the weakening of their immune system, infection of the respiratory track and lung are common in such people [4]. Visual impairment and middle ear infection are common among them also [5]. Neurological studies show that impairment in the central

nervous system involves the lobes and the different areas such as frontal lobe, caudate, putamen and damage of the gray matter in basal ganglia [6]. In one study, damage in gray matter (basal ganglia and thalamus), white matter and also medial temporal, is reported [1]. This disease causes disorder in peripheral and central nervous system, so, the language impairment is common [1, 3, 6, 7]. According to Browsers study, language impairment is one of the important and significant features of the neurological dysfunction in children with HIV [8, 9]. Risk factors can be effective in speech and language delay as well as cognitive impairment. Environmental factors such as interactional deprivation with the parents can be effective in decreasing communication in children with HIV [10]. Subsequently, communication disorder can cause speech and language disorder in these children [1, 11, 12]. The results of recent

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studies show that one of the most important areas which involve children with HIV is speech and language [7, 9, 13-15]. Other studies have shown that communication disorder affects the speech and language process [3, 7, 12, 15]. One of the areas related to speech disorder of children with HIV is phonological processes that can be developmental and non-development [9]. Neurologically, impairment in different areas of the brain such as the second area of auditory in Wernicke which is located in the temporal lobe, can cause phonological processes disorder, especially substitution process disorder [16]. The occurrence of these phonological processes can reduce the intelligibility of speech. In articulation test related to speech assessment, substitution and elimination processes decrease intelligibility [17].

In regard to limited investigation related to phonological processes, it seems the researches in this area are important [9, 14]. Therefore, the aim of this study was to investigate speech impairment in a child with HIV and to investigate its phonological processes.

## Case report

### *Participant, Target Behavior, and Setting*

A.K is a 5 year old boy who had been identified as a child with HIV. He was cared for by a nursery. His parents were addicts and he had a sister. So, A. k and his sister were infected with HIV. Primarily, the HIV antibody test was taken. Next, Western blood test had to be taken.

He was referred to speech therapy clinic from the nursery for the treatment of his speech disorders. According to the case history, it was reported that he had difficult in verbal communication rather than non-verbal with peers of same age. He wore glasses due to Amblyopia (optometry diagnosis) and his auditory assessment with auditory brain response (ABR) task showed no disorder. He had no physical problems. The child was referred to the clinic by a caregiver because of a speech problem. Also his speech was incomprehensible. Therefore, the target behavior was his speech and recognizable factor was his speech intelligibility.

Sessions were conducted in the clinical environment in a room, by a speech therapist that has five years of experience. The room contained a table and chair, without any distractive object.

### *Assessment*

First, speech assessment was analyzed according to diagnostic evaluation of articulation and phonology (DEAP). It is used to evaluate phonological disorders in children ages 3 - 6 years.

It was translated to Persian language by Zarifian (2017). It includes the articulation, phonology, and word inconsistency assessments screen to help clinicians differentiate between disorders of articulation; delayed phonological development and consistent phonological disorders [18]. The usefulness of DEAP is established in some studies [19]. DEAP is important in determining if a child has an articulation disorder, consistent phonological disorder or inconsistent phonological disorder and also

for the intervention plan [18].

This was started with diagnostic screen for 5 minutes. The aim of this was evaluation of the single-word production, phoneme stimulability, and single-word inconsistency. Through this section, single-word production enabled the child to produce each of the 14 words through pictures of them for assessment of articulation. All of these words were nouns. Each phoneme was placed in three situations, initial, medial and last of the word. We showed each of the picture to him. If he named them correctly, he was given neither praise nor oral encouragement. After the naming, each noun was subscribed by clinician. This second part, phoneme stimulation enabled him to test the ability of imitating the phonemes correctly, which were produced in error initially. After production of the words twice, the error phonemes must be marked every time. Again, the child was asked to articulate each error phoneme once again (based on the Articulation Single-Word Production task) [18]. If he could produce them, it would be stimulated to these phonemes. Third section, single-word inconsistency was tested by asking the child to rename the same words. As a result, the score of inconsistency was calculated. To calculate the inconsistency score, the number of words that are not produced the same in two different occasions are divided into all the words generated in two rounds. Therefore, the score of inconsistency was 57%.

It was more than 50%. According to P-DEAP inconsistency test and oral-motor must have been done [18].

Next part was related to phonology assessment to help in clarifying the pattern of errors by showing 50 pictures to this child. Each phoneme was placed through three placement, initial, medial and last of the word. Most of the words were gotten by imitation. All of them were transcribed.

### *Finding*

In the first part, related to single-word production, he could produce 4 words out of 14 words. He had a problem in the articulation of phonemes such as /č/ /š/ /k/ /q/ /g/ /t/ /s/ /r/ /dʒ/.

In the second part, the child in this present study was stimulated with some phonemes such as /t/ /n/ /d/ /k/ /m/ /b/ /g/ /j/ /s/.

The result of the phonology assessment showed, substitution phonological processes occurred most of all the processes with about 60%. Substitution processes such as velar fronting, stopping and final consonant deletion also occurred. After this, the elimination process was presented, such as the deletion of the liquid consonants at approximately 25%.

In other parts of P-DEAP, the oral-motor movement was tested by Diadochokinetic test [18]. Fast and alternative movements in continuous procedure by /PU TU/ and /PA TU CAKE/ were assessed. The score of movement of the tongue was 1. It means the general pattern was correct but there was a problem in the range of motion, power and speed of movement.

Mean of length utterance (MLU) in different tasks such as naming pictures, was 1. MLU was calculated by

division of meaningful words by the number of utterances. Rarely two words sentences were used and his pitch was low. The achieved language assessment was reported at Table 1. Also, linguistic areas were assessed based on TOLD-P (Test of language Development) (20). This test measures the various features of language ability including syntax, semantic and phonology in both the receptive and expressive language. So his score in expressive language was lower than his perceive language.

**Discussion**

As mentioned, the aim of this study was to investigate the speech impairment in a child with HIV and to investigate its phonological processes. According to some studies, phonological processes such as simplification, simplification of liquid consonants, final consonant deletion, velar fronting have been seen in phonological disorders [9]. The data obtained here characterize a severe impairment of phonological and lexical parameters, characteristic aspects of expressive language, in agreement with literature reports stating that changes in expressive language are one of the most marked characteristics of HIV-infected children [20-22]. Due to limited research related to this area and lack of determination of the most significant phonological process, this study was carried out. On the other hand, determination of the most significant phonological process is an important issue to help the speech therapist to prioritize assessment and rehabilitation services. Some study showed that children with HIV have a problem in expressive language more than in receptive language [8, 19, 21]. A, K in this study had a problem in expression more than understanding also. The most important point is that phonological processes remained in his speech. Significant features in his speech was determined by the

inconsistency score which was %57, which may result in his speech been unintelligible. Phonological processes such as substitution and simplification were found. The most significant phonological process was substitution such as velar fronting. Another significant process was stopping and consonant deletion. The substitution process can be an effective factor in decreasing intelligibility [17]. Hence, as was expected, he had speech problems such as lower intelligibility. Another reason in decreasing intelligibility could be the problem with the movement of the tongue.

Lorraine Sherr showed environmental deprivation can be an impressive factor in making communicational, speech and language problem in children with HIV [9, 10]. So, in the selected child, lack of parents can be a significant factor in communication disorder. Subsequently, it can cause speech and language disorder in this child [1, 11, 12]. Hence, there are some factors that can lead to speech impairment such as the intelligibility and phonological aspects in these children [1]. The involvement of the CNS by viral disease in HIV [2] and lack of communication [3] can be probable agents causing these disorders. In this case the deprivation of communication was an impressive factor in causing speech and language disorders considerably.

According to advances around the world, rehabilitation is moving to shorter methods in a short time to find the best method in order to create improvement. It should be pointed out that the discovery of the cause of impairment helped us to eliminate the negative factors and finding this point helps us to prioritize the best method for treatment.

*Limitation*

Since this child was referred by a nursery, there was limitation in getting more accurate information about the speech and language features. There was no data about

**Table 1:** Speech and language assessment

Language	Perception	Semantic level (vocabularies)	Nouns	Apple, banana, gloves, sandwich, hello, hat, shirt, pants
			Adjective	Blue, big, small
			Verbs	Come, sit down, stand up, go, give
			Function	Eating, drinking, wearing,
		Morphology	Pronouns	This, that
			Possessive Pronouns	Show me your hand Show me your feet Show me your eyes
		Syntax	Adjective clause	Give me a big book. Give me a small apple.
		Pragmatic	Communicative intention (request an objective), turn taking, using gestures in communication	
Language	Expressive	Semantic	Noun	Hat, Pants, Hello, Apple, Dog, Cat
			Verbs	Come, Give, Go
			Syntax	MLU
			MLU	One word, Rarely 2 words sentence
Speech	Oral-motor movement	Tongue movement		Heightening the tongue: positive Touching the sides of lips: positive Moving head while heightening the tongue Slow and sometimes wrong Lack of drooling
		Range of motion, power and rate		
	Loudness			Low
	Articulation	Phoneme articulation		/t/ /n/ /d/ /k/ /m/ /b/ /g/ /j/ /s/.

the pre verbal level and motor development stage due to the lifestyle of the child in the present study. Therefore, one of the most important limitation of the research was that the author could not differentiate diagnosis between CAPD and developmental delay in this research.

### Suggestion

It is suggested, that more research is needed on the phonological process and factors influencing speech intelligibility.

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