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Original Article

Comparison of Reading Comprehension Skill of Students with Severe to Profound Hearing Impairment from Second up to Fifth Grade of Exceptional Schools with Normal Hearing Students

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ABSTRACT

Background: Reading is known as one of the most important learning tools. Research results consistently have shown that even a mild hearing impairment could affect the reading skills. Due to the reported differences in reading comprehension skills between hearing impaired students and their normal hearing peers, this research was conducted to compare the differences between the two groups. The other aim was to find any changes in the reading ability of hearing impaired group during elementary school.
Methods: This study is a cross-sectional (descriptive–analytic) one in which reading comprehension ability of 91 students with severe and profound hearing impairment (33 girls and 58 boys) from 2nd up to 5th grade of exceptional schools were compared with 50 2nd grade normal hearing students in Ahvaz, Iran. The first section of Diagnostic Reading Test (Shirazi – Nilipour, 2004) was used in this study. Then the mean reading scores of hearing impaired students in each grade was compared with control group using SPSS 13 with Mann Whitney test.
Results: There was a significant difference between average scores of hearing impaired students (boys and girls) in 2nd to 5th grade with normal hearing students of 2nd grade ($P<0.001$). Reading comprehension scores of students with hearing impairment in higher grades had improved slightly, but it was still lower than that of the normal hearing students in the 2nd grade.
Conclusion: It appears that reading comprehension skill of students with significant hearing impairment near the end of elementary school years becomes weaker than normal hearing students in the second grade. Therefore, it is essential to find and resolve the underlying reasons of this condition by all professionals who work in the field of education and rehabilitation of these students.

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Introduction

Reading is known as one of the most important learning tools, therefore in many societies extensive planning and investments have been made to improve reading skills [1]. The purpose of reading comprehension is the ability to understand a text meaning and answering questions [2].

When normal hearing children begin to learn reading, most are competent language users. The task of reading

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can be mapped onto existing phonological, syntactic, and semantic and discourse skills. A deaf child initiates the reading task with different sets of language experiences. The frequently reported low literacy levels among students with sever-profound hearing impairment are in part due to discrepancy between their deficiency in spoken language system and the demands of reading as a speech based system [3].

Learning activities during pre-school years for deaf and hard of hearing students is different from their normal counterparts, hence, more attention should be paid to their curriculum planning, education output and reading comprehension [4].

As Holt (narrated from Musselman, 2000) mentioned most deaf teenagers and adults are severely delayed in terms of reading and their reading comprehension skills usually reaching at least to grade 4 or 5 level [5].

Also Cain used a picture word reading test for 9-15 years old normal hearing and hearing impaired children and found that reading age for 15 years old children with hearing loss at the base of this test was close to 9 years old normal hearing children [6].

In the study of Kyle and Harris hearing-impaired children who had less hearing loss and their problem was detected at younger age, used oral communication on regular bases, therefore they had achieved better outcomes in terms of their reading skills [7].

Several studies in Iran have explored reading skills of hearing impaired students in recent years.

Kakojuibari et al. studied reading literacy of hearing-impaired exceptional students of 4th graders, last year of guidance school and last year of high school and compared them with 4th graders with normal hearing students of primary schools. They used the Progress in International Reading Literacy Study (PIRLS 2001) booklets and found that there was a significant difference in reading comprehension between normal hearing and all the hearing impaired students. Only the students in last year of high school with moderate hearing loss had achieved similar score of the 4th graders with normal hearing students. They concluded that impaired hearing had a significant negative effect on the level of reading literacy and it is was suggested that it is necessary to change the curriculum and educational programs in exceptional centers in order to enhance reading literacy and to better use residual hearing [8].

Kakojuibari and Sharifi compared reading literacy of Iranian hearing-impaired students of 4th grade who were going to exceptional and regular schools. They used the PIRLS 2006 booklets and found that those students who attended regular schools had obtained better results, in compare with students who went to exceptional schools [9].

Rezaei et al. in their study compared reading skills of sever hearing impaired students in 5th grade of exceptional school with normal hearing students in the same grade. They

used several tasks and found that hearing impaired student's performance in some tasks such as; reading speed (words and non-words) was similar to their normal hearing counterparts but in reading accuracy and comprehension tasks (word and text) they significantly had achieved lower scores [10].

Mokhlesin et al. studied phonological awareness, working memory and reading comprehension in children with severe and profound hearing loss in 2nd grade of exceptional school students. Deaf students had significantly lower scores in all tasks compared to their normal peers except in visual working memory test [11].

Other similar studies such as Nikkhou et al. and Sharifi et al. also showed that deaf students in exceptional schools do not achieve reading skills similar to their normal hearing peers [12,13].

The aim of our study was to compare reading comprehension of students with severe to profound hearing loss from second up to fifth grade of exceptional elementary school with normal hearing students in second grade, to find how their reading skill progress during elementary school grades.

Methods

This research was a cross–sectional study. The sampling method was through census of hearing impaired population with an inclusion criteria of: 1) Not being mentally retarded, blind and without any history of serious neurologic disease, 2) Having a hearing loss of 71 dB or greater in the better ear according to the last audiogram, 3) No history of repeating a year in school. Considering these criteria, from 95 students, 91 were selected from two exceptional elementary schools in Ahvaz, Iran. All children were prelingually deaf and used monaural or bilateral hearing aids.

Normal hearing students' sampling were random and our inclusion criteria for this group were: 1- being monolingual (Persian), 2- having normal hearing 3- without any history of serious neurologic problems and not having repeated a year in school. Hence, 20 boys and 30 girls were selected from the nearest elementary school to the exceptional schools that the subjects were chosen.

The tools used in this study included:

1- Diagnostic Reading Test (Shirazi - Nilipour 2004)
2- Personal information questionnaire, including demographic information, general and medical history
3- Tape recorder to record the sound of children reading.

Diagnostic Reading Test composed of different parts, but we only used reading comprehension part which included 3 texts (Hamkari, Jooje and Parande). The first text used to become familiar with the test and it had no value in the overall score.

At first, attempts were made to create a friendly environment for students and then the purpose of test was explained for both groups. In the case of students with hearing impairment for better understanding, the explanations were given to them individually with the help of their teachers to explain questions in sign language. After preparing students and becoming familiar with the test, two main texts were presented. Then the reading questions were asked, if students with hearing impairment had difficulty in understanding the questions orally, again questions were shown to them in

written form.

During the calculation of reading comprehension scores, for each correct answer one point was given, if they answered questions by sign language, it was accepted as well.

In this study with software SPSS13; descriptive statistics and Mann-Whitney test was used to compare mean scores between two groups.

Results

As can be seen in Table 1, in both reading text all statistical indicators in male students with hearing impairment in second grade was zero and this shows a significant difference between the scores of students in this grade compared with normal hearing boys in the same grade. The table also shows that the mean scores, standard deviation and the maximum scores in male students with hearing impairment in higher grades had increased, but still were lower than second grade normal hearing students.

As can be seen in Table 2, in both reading text all statistical indicators in female students with hearing impairment in second grade was zero and this shows a significant difference between the scores of students in this grade compared with normal hearing girls in the same grade. The table also shows that the mean scores, standard deviation and the maximum scores in female students with hearing impairment in higher grades had increased, but still were lower than second grade normal hearing students.

When average scores for comprehension was evaluated, the total correct answers in the normal hearing boys and girls of the second grade compare with girls and boys with hearing impairment in second ,third, fourth and fifth grades showed a significant difference (Tables 3 and 4).

Table 1: Descriptive indicators related to reading comprehension of Jooje text (first row) and Parande text (second row) in boys

The total comprehension correct answers	Number	The minimum score	The maximum score	Mean	Standard deviation	Text
Normal Hearing students in second grade	30	0	5	4.40	1.10	Jooje
	30	2.0	5	4.60	0.72	Parande
Hearing impaired students in second grade	7	0	0	0	0	Jooje
	7	0	0	0	0	Parande
Hearing impaired students in third grade	15	0	4	0.80	1.08	Jooje
	15	0	3	0.57	1.08	Parande
Hearing impaired students in fourth grade	8	0	3	1.25	1.28	Jooje
	8	0	5	2.62	2.06	Parande
Hearing impaired students in fifth grade	28	0	5	2.1	2	Jooje
	28	0	5	2.03	2.34	Parande

Table 2: Descriptive indicators related to reading comprehension Jooje text (first row) and Parande text (second row) in girls

The total comprehension correct answers	Number	The minimum score	The maximum score	Mean	Standard deviation	Texts
Normal Hearing students in second grade	20	0	5	4.30	1.26	Jooje
	20	0	5	4.6	0.68	Parande
Hearing impaired students in second grade	8	0	1	0.25	0.46	Jooje
	8	0	1	0.12	0.34	Parande
Hearing impaired students in third grade	7	0	2	0.71	0.95	Jooje
	7	0	4	0.57	1.51	Parande
Hearing impaired students in fourth grade	8	0	2	0.62	0.91	Jooje
	8	0	3	0.75	1.16	Parande
Hearing impaired students in fifth grade	10	0	5	1.90	1.52	Jooje
	10	0	5	2.06	2.11	Parande

Table 3: Comparison between mean of total correct answers of Jooje and Parande texts in normal hearing and hearing impaired male students

Group / Variable	Normal hearing, grade 2	Hearing impaired, grade 2	Hearing impaired, grade 3	Hearing impaired, grade 4	Hearing impaired, grade 5
Jooje text	4.40	0.00	0.80	1.25	2.10
Parande text	4.60	0.00	0.57	2.62	2.03
		P<0.001	P<0.001	P<0.001	P<0.001

Table 4: Comparison between mean of total correct answers of Jooje and Parande texts in normal hearing and hearing impaired female students

Group / Variable	Normal hearing, grade 2	Hearing impaired, grade 2	Hearing impaired, grade 3	Hearing impaired, grade 4	Hearing impaired, grade 5
Jooje text	4.30	0.25	0.71	0.62	1.90
Parande text	3.60	0.12	0.57	0.75	2.60
		P<0.001	P<0.001	P<0.001	P<0.001

Discussion

As it was mentioned in the findings, difference in mean scores in both texts and genders was significant. When comparing scores from second to fifth grade hearing impaired students, we realized that despite increasing scores in all groups with hearing impairment and even being a maximum score of 5 in fifth grade students, the mean scores was still significantly less than normal hearing students in the second grade.

According to the results, it seems that students with hearing impairment were still in the phase of learning how to read at the end of elementary school and most likely they will have a long way ahead to become a competent reader. This was consistent with the results of Kakojoibari study [8] that found lower reading skill in hearing impaired students even at the end of high school.

The result of this study was also consistent with Sharifi and his colleagues, Rezaei and colleagues study [3,10].

Even though they were between 11 to 17 years old when they finished elementary level, but their reading comprehension skill was poorer than the normal second grade students.

In this study, Students with hearing loss used their visual effects much more to respond to questions, majority of them did not understand the reading questions orally or even with gestures but if the question was presented in a written form they were able to answer better. This could be explained by a relationship between visual memory and reading comprehension. In Mokhlesin et al., Harris and Moren , and MacSweeney et al., better reading comprehension was related to better visual memory and also phonological awareness [11,14,15]. On the other hand, there was no relation between auditory verbal memory and reading comprehension in Mokhlesin et al., Rezaei et al., and Koo et al. studies [11,16,17].

Initially, many students with hearing impairment answered the first question better which was the easiest and most objective question than the rest of questions. It showed that questions which were linguistically easier to comprehend could be answered better. Based on Mayberry study language skill (speech or sign language), is the best predictor for reading success in hearing impaired children [18].

Conclusion

As a final point, according to our result, it appears that reading comprehension skill of students with significant hearing impairment near the end of elementary school years is still weaker than normal hearing students in the second grade. The result of this research can be effective in raising awareness of various specialists in the field of education and rehabilitation regarding the level of reading skills in students with severe to profound hearing impairment in exceptional schools to investigate the causes of this condition and decrease the negative factors.

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