Function and Disability Journal ISSN: 2588-6304
Original Article

# Comparative Study of Lexical Semantic Ability in Hearing and Hearing Impaired Adults

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**Article Info**

Received: 2018/04/12
Accepted: 2018/07/25
Published Online: 2018/09/27

DOI: 10.30699/fdisj.1.3.1.33

**How to Cite This Article**

Mousavi F, Jenabi M S, Kamali M, Sanei H, Azari S, Amiri-Shavaki Y. Comparative Study of Lexical Semantic Ability in Hearing and Hearing Impaired Adults. Func Disabil J. 2018; 1 (3) :33-39

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**ABSTRACT**

**Background and Objective:** People with more lexical semantic abilities can be more achieved in communicating with others, and in understanding the spoken or written words or sentences of others. The aim of this study was determination and comparison of lexical semantic ability in hearing and hearing impaired adults from mild to profound levels of hearing loss.

**Methods:** This study is a cross-sectional descriptive analytic and non-interventional study. Lexical semantic ability of 20 normal and 73 hearing impaired (16 mild, 17 moderate, 20 severe, and 20 profound hearing impaired) evaluated by the lexical semantic test. Normal adults were 7 males and 13 females, and hearing impaired adults were 23 males and 50 females. The participant's age range was 18-58 years old. The lexical semantic test has 44 MCQs in its two alternate forms. Descriptive statistics, Kolmogorov-Smirnov test, U Mann Whitney test, and Kruskal-Wallis test were used for description and analysis of the data.

**Results:** Statistical comparison of mean scores in two groups of hearing, and hearing impaired showed that mean scores of hearing group was significantly more. Scores of hearing, mild, moderate, and severe groups decreased respectively, but the scores of profound group was slightly more than severe group. The differences between scores of these groups were significant.

**Conclusion:** According to the findings of this research, we can conclude that hearing impairment can have adverse effects on lexical semantic ability of adult persons. The other important finding of this study was that the more the hearing impairment, the more its adverse effect on lexical semantic ability.

**Keywords:** Adults, Hearing, Hearing impaired, Lexical semantic, Mild, Moderate, Profound, Severe

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## Introduction

Semantic aspect of language is very important, and cause language developments to be active and continuous (Hoff, 2009; Hoff & Shatz, 2009). Hearing is one of the variables that may affect speech understanding (Ferguson, Jongman, Sereno, & Keum, 2010). Hearing impaired persons may have different levels of language impairment with respect to the level of hearing loss (Gilbertson & Kamhi, 1995). By having a mild or moderate hearing loss, and receiving appropriate auditory rehabilitation services, there may be a moderate or no language problem, but severe or profound hearing im-

pairment can limit opportunities for learning of spoken words (Auer, Bernstein, & Tucker, 2000; Fagan & Pisoni, 2010), and these persons usually cannot achieve a spoken language system which is a barrier for learning to become literate (Mayer, 2007). This situation leads to a limited spoken or even written vocabulary.

Snowling (1998) showed that semantic processing abilities can interact with phonological processing (Nation & Snowling, 1998). It is evident that phonological processing can be deviated or ruined by hearing loss, specially by severe or profound hearing loss. When semantic processing is deviated from auditory input, learning and using of words can be abnormal from auditory modality; because it has been shown that the spoken vocabularies of children is strongly related to the quality and quantity of spoken language that they receive from others around them (Hart, 1991; Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991; Weizman & Snow, 2001), and usually severely hearing impaired do not learn optimal level of sign language in first years (Ormel, 2008). In this circumstances of language development in which content and usage of language is affected more (Vinson, 2001), semantic aspect of language can be affected too, and therefore, hearing loss may lead to a limited vocabulary in childhood, which may be continued till adulthood, and they may have problems in written and verbal communication (Northern & Downs, 2002). Lexical development of children with problem in hearing is so that their linguistic knowledge is in qualitative and quantitative lower level (Luckner & Cooke, 2010). The level of the impairment can be dependent on the level of hearing impairment (Gilbertson & Kamhi, 1995).

Written form of evaluation can be more valid when the intelligibility of speech is low in hearing impaired people (Landells, 1989; Moores, 2001). A lexical-semantic test was developed for assessment of Persian adult speakers with hearing impairment, and its validity and reliability in adults with severe to profound hearing loss was determined (Tahmasian, 1393).

Prevalence of hearing loss in Iran is reported in different studies. In one of these studies 59,678 persons were chosen randomly by systematic and cluster method of sampling; and above 40 dB hearing loss was considered by using of Pure-Tone Average (PTA); and these results were reported in the country: bilateral hearing loss was 2.6 percent, more than 2/1 % which was reported of the world prevalence, as announced by WHO (JOGHATAEI, MOHAMMAD, SAADAT, & RAHGOZAR, 2004); this prevalence in men was 2.5 % and in women was 2.0 %, in rural areas was reported 2.8 %, reported in urban areas 2.2 %, and of bilateral profound hearing loss (>90 dB HL), the prevalence was 2.3 per thousand (JOGHATAEI et al., 2004). Other reported rates for prevalence were reported too. Some of these are 7.1 per 1000 individuals who were suffering from hearing impairment and 4.3 per 1000 were deaf (Hajloo & Ansari, 2011), and 4.8 in 1000 live births (Arjmandi, Mehrabi, Fahangfar, Toghiani, & Kheradmand, 2012).

This study is designed with respect to the prevalence of hearing impairment, adverse effects of related speech and language problems, especially in semantic aspect of language, and presence of a Persian lexical semantic test, but absence of information about lexical semantic ability of different levels of hearing impairment. The main aim of this study is determination and comparison of lexical semantic ability in hearing and hearing impaired adults with mild, moderate, severe and profound hearing loss.

## Methods

This is a cross-sectional, descriptive, and analytic study. The sample was 73 hearing impaired persons (23 males, and 50 females) selected from Kashan center of the Deaf, and 20 normal hearing persons (7 males, and 13 females) from Siapa Company in Kashan. All of them were Farsi speakers and were literate and could complete the questionnaires of two alternate forms of lexical semantic test. According to inclusion criteria, they had age range of 18-58 years; hearing group had no hearing impairment, but hearing impaired persons had some levels of hearing impairment in both of their ears; none of them had other disability such as blindness, cerebral palsy, or mental retardation; none of them had cochlear implant, and the hearing impaired groups had a history problem of 5 years old. They were free for rejecting of participation in this research, but all of

*Table 1. Distribution of studied persons according to gender, and hearing status*

| Hearing status Gender | Normal Hearing (n=20) | Mild hearing imp (n=16) | Moderate hearing imp (n=17) | Severe hearing imp (n=20) | Profound hearing imp (n=20) | Total Hearing imp (n=73) |
|---|---|---|---|---|---|---|
| Males | 7 | 5 | 7 | 5 | 6 | 23 |
| Females | 13 | 11 | 10 | 15 | 14 | 50 |

*Table 2: Descriptive statistic values of lexical semantic scores in normal and hearing impaired groups*

| | | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| Alternative form (1) | (Hearing (n=20 | 20.05 | 2.95 | 12 | 22 |
| | (Hearing impaired (n=73 | 11.42 | 5.27 | 3 | 22 |
| Alternative form (2) | (Hearing (n=20 | 20.30 | 2.99 | 9 | 22 |
| | (Hearing impaired (n=73 | 11.23 | 5.45 | 1 | 22 |
| Total | (Hearing (n=20 | 40.35 | 5.49 | 21 | 44 |
| | (Hearing impaired (n=73 | 22.66 | 10.24 | 7 | 44 |

*Table 3: The results of statistical comparison of lexical semantic scores in normal and hearing impaired groups*

| Scores | Mean of hearing group | Mean of hearing impaired group | U | Z | P |
|---|---|---|---|---|---|
| Scores of alternative form (1) | 20.05 | 11.42 | 125.500 | -5.669 | 0.000 |
| Scores of alternative form (2) | 20.30 | 11.23 | 119.500 | -5.721 | 0.000 |
| Total scores | 40.35 | 22.66 | 111.500 | -5.791 | 0.000 |

them cooperated deliberately. After signature of consent form, they completed a questionnaire including demographic data; and they completed the questionnaires of two alternate forms of lexical semantic test.

The lexical semantic test is developed by Tahmasian et al. The overall average of content validity ratio and index of the test were obtained respectively +1 and 0.923. Cronbach's alpha value was equal to 0.918. In correlation between test-retest scores, there was a positive significant correlation between the scores (r = 0/893, P=0.000).

The instructions was explained for completing the consent form and questionnaires of the lexical semantic test, and then they completed the questionnaire in a nearly quiet room. Each alternate form of the lexical semantic test has 22 question with a sentence as body of any question in which the aim word is highlighted, and underlined; and then, there is four choices for each of the questions.

SPSS 21 software (SPSS Inc., Chicago, Illinois, USA) was used for performing of data analysis at a P-value of less than 0.05 was considered significant. Descriptive statistics were used for calculation of different variables such as frequency, mean score, standard devia-

*Table 4. Descriptive statistic values of lexical semantic scores in normal, and mild, moderate, severe, and profound hearing impaired groups*

| Groups | scores | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| Normal Hearing (n=20) | Alternative form (1) | 20.05 | 2.95 | 12 | 22 |
| | Alternative form (2) | 20.30 | 2.99 | 9 | 22 |
| | Total | 40.35 | 5.49 | 21 | 44 |
| Mild hearing imp. (n=16) | Alternative form (1) | 15.13 | 5.56 | 6 | 22 |
| | Alternative form (2) | 15.13 | 5.86 | 4 | 22 |
| | Total | 30.25 | 11.22 | 11 | 44 |
| Moderate hearing imp. (n=17) | Alternative form (1) | 12.94 | 4.62 | 6 | 22 |
| | Alternative form (2) | 12.88 | 4.57 | 5 | 21 |
| | Total | 25.82 | 8.24 | 14 | 42 |
| Severe hearing imp. (n=20) | Alternative form (1) | 9.05 | 4.80 | 3 | 20 |
| | Alternative form (2) | 8.75 | 4.80 | 3 | 21 |
| | Total | 17.80 | 9.10 | 8 | 40 |
| Profound hearing imp. (n=20) | Alternative form (1) | 9.55 | 4.10 | 3 | 21 |
| | Alternative form (2) | 9.20 | 4.34 | 1 | 21 |
| | Total | 18.75 | 7.72 | 7 | 42 |

*Table 5. The results of statistical comparison of lexical semantic scores in normal, and mild, moderate, severe, and profound hearing impaired groups*

| Parameter Total or alternative | Chi-Square | df | P |
|---|---|---|---|
| Alternative form (1) | 44.249 | 4 | 0.000 |
| Alternative form (2) | 44.384 | 4 | 0.000 |
| Total | 46.545 | 4 | 0.000 |

tions, and maximum or minimum scores. Kolmogorov-Smirnov test, U Mann Whitney test, and Kruskal-Wallis test were used for description and analysis of the data.

## Results

The aim of this study was determination and comparison of lexical semantic ability in hearing and hearing impaired adults from mild to profound levels of hearing loss.

Participants of this study were 13 and 9 hearing women and men respectively, and 23 and 50 male and females in four groups of mild, moderate, severe, and profound hearing impaireds (Table1).

Table 2 includes descriptive statistic values including mean, standard deviation, minimum, and maximum of lexical semantic scores in normal and hearing impaired groups. The data shows that mean scores of hearing group was greater than hearing impaired groups both in alternate forms (1) and (2), and total scores of lexical semantic test. The differences must be analyzed by statistical tests for determination of significance (Table 3). U Mann Whitney test showed that the mentioned differences were statistically significant both in total score and also in scores of each alternate forms of the test.

According to the data in Table 4, lexical semantic scores of hearing persons were the greater scores, and the total scores, and scores of any alternative form, were the least scores in severe hearing impaired group. The scores of mild, moderate, and severe groups decreased respectively, but the scores of profound group slightly increased a little more than severe group. Kruskal-Wallis test was used for comparison of the different means of the groups. The differences between scores of these groups were significant (Table 5), both in total score and also in scores of each alternate forms of the test.

## Discussion

Determination and comparison of mean scores of lexical semantic test in normal and different levels of hearing impairments can help us to know more and more documented information about the present situation in these groups for future more research, and decision-making in rehabilitation of these clients.

According to the results of this study, descriptive statistic values including mean, standard deviation, minimum, and maximum of lexical semantic scores in normal and hearing impaired groups determined and reported. The data showed that mean scores of hearing group was significantly greater than hearing impaired groups both in alternate forms (1) and (2), and total scores of lexical semantic test. This finding is such as findings of other reports (Gilbertson & Kamhi, 1995; Tahmasian, 1393).

Comparison of scores of hearing group and groups with different levels of hearing impairments showed that the least the hearing impairment, the greater the scores of lexical semantic test. In other words, the scores of mild, moderate, and severe groups decreased respectively, but the scores of profound group was slightly increased a little more than severe group. The differences between scores of these groups were significant and compatible with prior findings (Auer et al., 2000; Fagan & Pisoni, 2010; Gilbertson & Kamhi, 1995). Severe and profound hearing impaired groups which had lower lexical semantic scores has more limitations in semantic aspect of language, may misunderstand many of messages of hearing people, and may have more communicative problems in their social relations or communications, which is noted by some other researchers (Luckner & Cooke, 2010; Northern & Downs, 2002; Vinson, 2001).

## Conclusion

According to the findings of this research, we can conclude that hearing impairment can have adverse effects on lexical semantic ability of adult persons. The other important finding of this study was that the more the hearing impairment, the more it effects adversely on lexical semantic ability.

## Limitations to the Study

The research studied only 20 normal and 73 hearing impaired persons which was less than 20 persons in two of the mild and moderate groups, and it was not possible for researcher to match according to education and communication type.

## Acknowledgments

This article is derived from a thesis of Speech-Lan-

guage Pathology Department of School of Rehabilitation Sciences of Iran University of Medical Sciences (IUMS). The normal and hearing impaired participants of this study were selected from Kashan center of the Deaf, and Siapa Company in Kashan.

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Function and Disability Journal ISSN: 2588-6304
مقالهٔ پژوهشی

# مقایسه توانایی معناشناسی واژه گانی در بزرگسالان شنوا و ناشنوا

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اطلاعات مقاله

تاریخ وصول: ۱۳۹۷/۰۱/۲۳
تاریخ پذیرش: ۱۳۹۷/۰۵/۰۳
انتشار آنلاین: ۱۳۹۷/۰۷/۰۵

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چکیده

**زمینه و هدف:** کسانی که توانایی معناشناسی واژگانی‌شان بیشتر است، بهتر می‌توانند با دیگران ارتباط برقرار کنند و معنی جملات بیان‌شده و نوشته شدهٔ دیگران را درک کنند. پژوهش حاضر به تبیین و مقایسه توانایی معناشناسی واژگانی بزرگسالان شنوا و کم‌شنوای خفیف تا عمیق پرداخته است.

**روش کار:** این مطالعه یک پژوهش توصیفی تحلیلی و غیرمداخله‌ای از نوع مقطعی است. توانایی معناشناسی واژگانی ۲۰ فرد شنوا و ۷۳ فرد مبتلا به آسیب شنوایی (۱۶فرد با آسیب خفیف، ۱۷ فرد با آسیب متوسط، ۲۰ فرد با آسیب شدید و ۲۰ فرد با آسیب عمیق) با استفاده از آزمون معناشناسی واژگانی مورد ارزیابی قرار گرفت. گروه شنوا شامل ۷ مرد و ۱۳ زن و گروه دارای آسیب شنوایی شامل ۲۳ مرد و ۵۰ زن بود. محدوده سنی افراد مورد مطالعه ۱۸ تا ۵۸ سال بود. آزمون معناشناسی واژگانی دارای ۴۴ سؤال چهارگزینه‌ای است که هر یک از ۲ فرم همتای آن دارای ۲۲ سؤال است. برای توصیف و تحلیل داده‌ها از آزمون کلموگروف اسمیرنف، آزمون یو من ویتنی و آزمون کروسکال والیس استفاده شده است.

**یافته‌ها:** مقایسه آماری میانگین نمرات آزمون معناشناختی واژگان در دو گروه شنوا و کم‌شنوا نشان داد که میانگین نمرات گروه شنوا به‌طور معنی‌داری بیشتر است. نمرات گروه شنوا و گروه‌های دارای آسیب شنوایی خفیف، متوسط و شدید به ترتیب به طور معنی‌داری کمتر بود، ولی نمرات گروه کم‌شنوای عمیق، اندکی بیشتر از نمرات گروه کم‌شنوای شدید بود. تفاوت‌های بین نمرات اکثر گروه‌های مورد مطالعه معنی‌دار بود.

**نتیجه‌گیری:** بر اساس یافته‌های این پژوهش، می‌توانیم نتیجه بگیریم که آسیب شنیداری می‌تواند اثرات مخربی بر توانایی معناشناسی واژگانی افراد بزرگسال داشته باشد. یافته مهم دیگر در این پژوهش، این بود که هر چه آسیب شنوایی بیشتر باشد اثرات مخرب آن بر توانایی معناشناسی واژگانی فرد نیز بیشتر خواهد بود.

**واژه‌های کلیدی:** بزرگسال، شنوایی، آسیب شنوایی، معناشناسی واژگانی، خفیف، متوسط، شدید، عمیق