

«Letter to Editor»

## Evaluation of hearing aid function among students of Rudaki deaf school in Ahvaz city

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### Abstract

Suitable hearing amplification in hearing-impaired students is essential to improve learning process. The main purpose of this (a descriptive-analytic and a cross-sectional) study is to access to the exact statistical data of hearing aids and ear molds, the onset age of hard of hearing and the age of receiving hearing aids in hearing-impaired students of Ahvaz Rudaki deaf school. Furthermore, the researchers questioned the parents to find out the probable causes of hearing aid non-usage. In this investigation the researchers evaluated hearing aids, ear molds and the usefulness of hearing aids of the all students at Ahvaz Rudaki deaf school. Out of a total number of 66 students, 48 students (sixty-two hearing aids) were evaluated. Totally 21 hearing aids (33.8 percent) and 22 ear molds (35.48 percent) had problems. In defective hearing aids, hearing aid sound offset (52.38%) was the major problem. There was a statistical difference in hearing threshold, before and after using a hearing aid ( $p < 0.05$ ). Unsatisfactory of student and loud sound of hearing aid were two main reasons of non-using of hearing aid among children. An appropriate setting for hearing aid and making a good ear mold, can help the children that are hard of hearing to attain a desired hearing. So monitoring of hearing aid function and ear molds condition in hearing impaired students is highly recommended.

**Key words:** Hearing aid, Student, Hard of Hearing, Satisfaction

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Hearing system abilities such as acoustic processing, frequency selection, comprehension and clarity of intensity, time clarity and speech comprehension are affected by hearing loss. These problems are diminished by hearing aids and so more speech comprehension and better communicative abilities are achieved (1).

Hearing-impaired children need an early, continuous and effective amplification wherefore this can develop the social and lingual skills (1 & 2). Therefore, suitable amplification that is relevant to hard of hearing degree is necessary in achievement of maximum benefit of educational programs in children (3). But unfortunately, poor hearing aid function in deaf schools was a major problem from the past to the present.

Because of social and high cost problems many hearing-impaired people use their hearing aids with disinclination and this can exceed probably with dissolving current problems during the hearing aid prescription and fitting process. Major of reported problems in hearing aids are: unsuitable fitting, blocking ear molds with cerumen, feedbacking, cerumen accumulation and ear perspiring (4). Based on WHO proposed model (1980), disability has a negative impact on life quality and incorrect hearing aid fitting restricts psychosocial function (5, 6). There are many factors such as age, type and degree of hearing loss, hearing aid usage experience, hearing processing abilities and etc. that can affect the successful usage of hearing aids. (5)

In this cross-sectional study, function and efficiency of all student's hearing aids in Roodaki deaf school is investigated. In coordination with school staffs and students' parent testimonial, students were referred to polyclinic No.2 in department of rehabilitation of JundiShapur university of

Ahwaz. Sixty six students were transferred there from May to June 2012. Eighteen of them were rejected from the test because of some problems such as lack of hearing aids, absence of hearing aids and non-cooperation in tests.

In this study the following measures were done: check of all hearing aids' components with an estethoclips, pure tone audiometry with & without hearing aid use, evaluation of nonfunctioning earmolds such as tube perforation (and change the child's ear mold if necessary), determining the onset age of hard of hearing & the age of using hearing aid (by asking from parents), determining the probable reasons of disuse of hearing aids or delay in having hearing aids (by asking from parents). Finally all of the data analyzed by statistical test such as distribution tests, tend to center tests, paired t-test & independent t-test. For this reason we used SPSS ver.16.

Twenty-six (54.2 %) of evaluated students (n=48) were boys and rest of them were girls. The mean students' age was 10.97 (ranged from 5 to 18 years) with standard deviation of 3.0658.

The average age of hard of hearing onset was 18 months (range: 0- 6 years old). Also the mean age of receiving hearing aid was reported around 4 years old (ranged from 7 months to 9 years old). The average duration time between determining age of hearing loss and receiving age of hearing aid was 2.5 years ( range: 0 – 8 or 9 years).

More data about how distribution of ear molds & laterality of hearing aids are shown in table 1. As you see in table 2, from 62 hearing aids, 21 hearing aids (33.8%) and 22 ear molds (35.48 %) had problems. We referred these hearing aids and ear molds to contact seller of hearing aid and we made ear mold from child's ear if necessary. Finally and after all repairs, efficiency of 56

remaining hearing aids was evaluated by determining the hearing threshold with and without hearing aid use. Distribution of hearing aids and ear molds problems are shown in table 2. As you see, in nonfunctional hearing aids the offset of sound (52.38 %) and in ear molds problems, non- properly functioning of them (81.81 %) were the highest problems.

The main purpose of this study was to evaluate the hearing aid benefit & efficiency. To evaluate all frequencies we used pure tone audiometry from 500 to 4000 Hz and audiometer model CA85 (Pejvak Ava co, IRAN). Hearing thresholds were evaluated in two situations: by using headphone in without hearing aid condition and by using speakers in with hearing aid condition. We used the modified limited procedure and pure tones to evaluate the hearing thresholds. Patients were asked to raise their hands if they heard very weak sounds. In all frequencies, there was a significant statistical difference between hearing thresholds with and without hearing aid (after repairing and re-fitting the non-functional hearing aids or changing the problematic ear molds) ( $p < 0.05$ ).

This means that after problematic removal or refitting of hearing aids all of them had suitable benefits for the children. Based on results are shown on table 3, although there is a significant statistical difference between hearing thresholds with and without hearing aid, in any frequencies the students hearing threshold with hearing aid lie, neither in normal hearing range nor in mild hearing loss range.

Another purpose of this survey was to evaluate reasons of non-using, less using or unsuitable using of hearing aids by asking parents. Child unsatisfactory and noise of hearing aid were two main reasons of non-using of hearing aids. There was not any similar study in which compares these

results with them. It seems that it is strongly possible to consequent these problems by well-timed prescription and suitable refitting of hearing aid. Many deaf children did not gain enough amplification because ear mold and hearing aid check were not a part of their rehabilitation process.

Geath and Loundsbury (1967) specified that deaf children parents had less information about hearing aid function and its care methods. Also, they mentioned that schools had less information about the hearing aids care as a part of deaf educational programs (7). Therefore, some percentages of insufficient amplification of hearing aids in deaf students can decrease by continuous monitoring by parents, school staffs and audiologists. Hearing aids are not complicated and everyone can learn how to monitor them. It is necessary that each school has a battery tester and an estethoclips and its staffs must learn how to check ear molds and hearing aids (2).

The aim of hearing aid prescription is to rise up the speaking and the hearing ability till hearing loss may not become to a disability. Early and good fitting of hearing aids, using continuously and working truly of them, and receiving enough hearing input were necessary to a sufficient speaking and comprehension skills. But, unfortunately this process encounter delay because of some reasons such as lack of parenting knowledge or child's unwillingness and his/her unsatisfactory to use hearing aids. So, it is recommended that a fulltime audiologist presents in deaf school to describe the hearing aid caring instructions and hearing aid following schedule. It is suggested that recruitment a part-time audiologist to consultation in deaf schools that they cannot employ a fulltime audiologist. Also, every school in every region has to share every experience (2).

**Table 1. Frequency distribution of hearing aid type, ear mold type & laterality of hearing aids (n=62)**

Frequency	Hearing aid type			Ear mold type		Monaural hearing aid	Binaural hearing aid
	Analog	Digital	Programmable	Hard shell	Soft shell		
62	26	16	20	39	23	32	15

**Table 2. Frequency distribution of hearing aid problems and nonfunctional ear molds**

Hearing aid problems		Frequency	Percent
		Totally sound offset( microphone or receiver problems)	11
Hearing aid problems	Feedback	7	33.33%
	Broken or nonfunctioning hook	2	9.52%
	Broken battery door	1	4.76%
Ear molds problems	Nonfunctioning	18	81.81%
	Broken or nonfunctioning tube	4	18.18%

**Table 3. Right and left ear hearing thresholds of students in “with and without hearing aid use conditions” (n=56)**

	Test type	Frequency			
		500 Hz	1000 Hz	2000Hz	4000Hz
Right ear(n=28)	Without hearing aid	83.357	91.9643	96.0714	100.1932
	With hearing aid	51.6071	52.8571	62.5000	78.8462
	P value	p<0.001	p<0.001	p<0.001	p<0.001
Left ear(n=28)	Without hearing aid	102.2222	99.2857	93.9286	85.5357
	With hearing aid	77.5926	63.9286	49.8214	47.5000
	P value	p<0.001	p<0.001	p<0.001	p<0.001

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