COMPARING HEARING AID FITTING OF THE MANUFACTURER'S FIRST FIT VERSUS NAL-NL2 USING REAL EAR MEASUREMENTS

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Introduction

Real ear measurments (REMs) or the probe microphone measurments is an objective method to verify hearing aids fitting taking into account the ear canal acoustics of the patient. It is the best method to provide a patient with an audible signal.

Prescriptive fitting formulas, such as NAL-NL1, NAL-NL2, and DSL V5a are evidence-based methods for determining how much amplification is needed for a particular hearing loss. By using prescriptive formula verified with REMs at the initial hearing aid fitting allows the audiologist to ensure audibility for conversational speech, to set appropriate amounts of amplification for soft sounds, and to prevent loud sounds from becoming uncomfortable.

Some audiologists use the first-fit formulas of the manufacturer to have a proper fitting gain, however, many studies revealed that the first fit of the manufacturer is insufficient for the required gain.

Self-report outcome measure is also mandatory to determine the benefit of hearing aids. The Abbreviated Profile of Hearing Aid Benefit questionnaire (APHAB) is used to measure disability caused by hearing loss and measure the reduction of that disability by using hearing aids. The APHAB uses 24 elements including 4 dimensions: ease of communication, reverberation, background noise, and aversiveness to sounds.

Speech recognition is important to communicate with others and with the society. In hearing impaired patients, there is difficulty in recognizting speech, especially in background noise. The hearing in noise test is an adaptive speech in noise test used for accessing the patient's capability of understanding speech in occurrence of noise so as to know the benefit from the hearing aid or to compare between hearing aids. Nilsson et al,1994 developed the Hearing in Noise Test (HINT), for determining sentence speech recognition threshold (sSRT) in both silent and noisy environments.

Aim of the work

The aim of the work was to compare manufacturer first fit and hearing aids programmed to NAL-NL2 using real ear measurements.

Subjects and Methods

The study was carried out on 20 adult subjects referred to the Audio Vestibular Medicine Unit, Alexandria Main University Hospital.

- Subjects were divided into two groups:

The first group consisted of 10 adult subjects with hearing aids fitted with the manufacturer's first fit. Eight subjects used Inizia-1 CPx; Bernafon, Switzerland, and two subjects used Coselgi U-FP 4; Widex, Denmark. The manufacturer's fit formula of both bernafon and widex is based on NAL-NL1.

The second group consisted of 10 adult subjects with hearing aids programmed to NAL-NL2 using real ear measurements. Six subjects used Inizia-1 CPx; Bernafon, Switzerland, and four subjects used Coselgi U-FP 4; Widex, Denmark.

All included participants in the study were subjected to history taking, otoscopic ear examination, tympanometry, pure tone audiometry and the unaided half of the APHAB questionnaire. The hearing aids of first group were fitted to the manufacturer's first fit.The hearing aids of the second group were fitted to NAL-NL2 formula and then verified using real ear insertion gain measures by using Affinity 2.0, Interacoustics, Denmark. Patients were acclimatized to their settings for four weeks and returned for assessment of performance via Aided thresholds, HINT and the aided half of APHAB.

Results

		Real ear measurements (n = 10)	Manufacturer's fit (n = 10)	Test value P value
Age	Mean ± SD	62.60 ± 10.62	54.40 ± 12.83	T = 1.56 P = 0.14
	Median	56.00	59.00	
	Min – Max	54.00 – 80.00	40.00 – 69.00	
Gender: n (%)	Males	4 (40%)	2 (20%)	X^2 = 0.95 P^{FE} = 0.63
	Females	6 (60%)	8 (80%)	

Table (1): Comparison of demographic data of the studied groups.

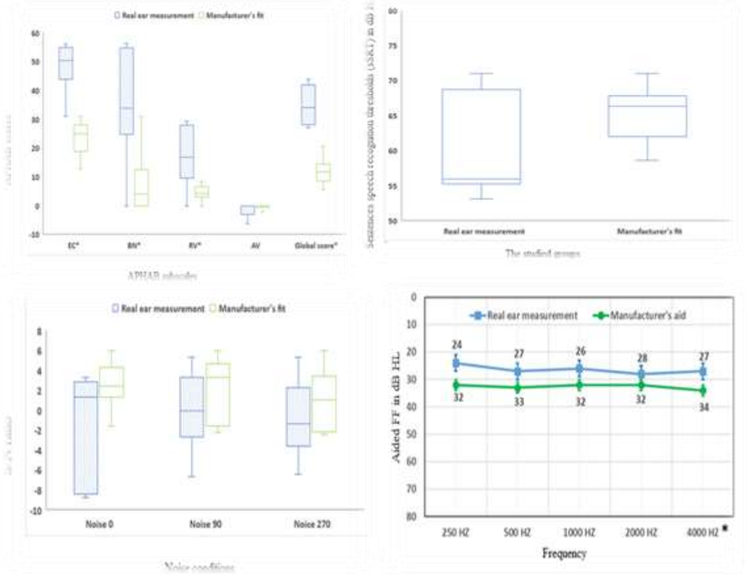

Figure (1): Box plots showing benefit of APHAB subscales in the two studied group. The EC, BN, RV benefit scores as well as the global score of REMs group were statistically higher than that of the manufacturer's fit group.

Figure (2): Box plots showing the quiet condition of HINT in the two studied groups. No significant difference was found between the two groups.

Figure (3): Box plots showing noise conditions of HINT in the two studied groups. No significant difference was found between the two groups.

Figure (4): Aided free field in the two studied groups. The 4000 HZ was statistically lower in REMs group than that of manufacturer's fit group.

Conclusion

APHAB questionnaire benefit scores for subscales EC, BN, RV and the global benefit score was significantly higher (better) in REMs group compared to manufacturer first fit in the tested hearing aids. HINT showed no significant difference in quiet and in noise conditions between the two groups. Aided free field showed significant difference between the two groups only at 4000 HZ.