STUDYING THE ACCURACY OF SOUND LOCALIZATION IN NORMAL HEARING SUBJECTS WITH TINNITUS

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INTRODUCTION

Tinnitus is a phantom auditory sensation that affects approximately 10- 20 % of the general population. Subjective tinnitus is characterized by an ongoing conscious perception of a sound in the absence of an actual external sound source. Previous studies reported that tinnitus hinder concentration, attention ability and hearing performance, even in normal hearing patients.

The sound localization ability is one of the higher functions of the hearing system. Binaural hearing is important for sound Localization as it needed for the perception of interaural intensity differences (IID) and interaural time differences (ITD).

As the effect of tinnitus on localization is still controversial. We examine whether tinnitus can affect sound localization ability or not in normal hearing individuals with and without tinnitus using different stimulus at different situation.

AIM OF THE WORK

The aim of this study was to test localization accuracy in tinnitus patients with normal hearing.

PATIENTS AND METHODS

Patients: This study involved two groups of subjects a 20 patient in tinnitus group and 20 patient in group who never experienced tinnitus before both groups with normal conventional PTA. The study was conducted in the audiology unit, Otorhinolaryngology department of Alexandria main university hospital.

Method: Informed consent was taken from all participants, history taking followed by full basic Audiological evaluation, then psychoacoustic assessment for tinnitus (loudness matching, pitch matching), followed by Tinnitus questionnaire Arabic version of the Tinnitus handicap inventory (THI), finally we performed sound localization test in sound treated room by using 5 speakers. As we assessed frontal field by dividing it into two quarters each one was tested separately. Speakers were positioned in a semicircle at a distance of 1 m from the subject, at 22.5-degree intervals. Subjects were asked to identify the stimulus-presenting speaker, through a forced-choice procedure in quiet and in noisy situation. The error score was calculated by scoring 1 point for each 22.5 degrees of difference between the stimulus-presenting speaker and the speaker identified by the subject.

RESULTS

PTA matching thresholds between tinnitus and control group with no statistically significant difference.

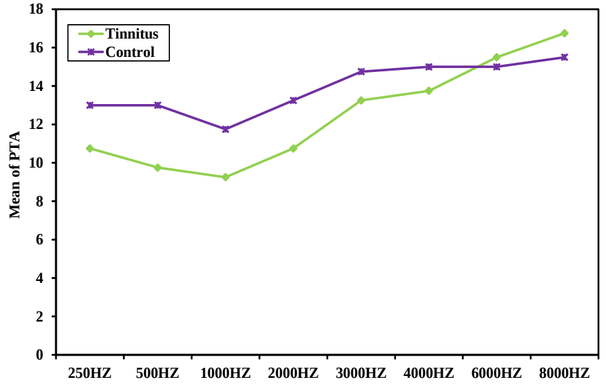

Figure1: Comparison between the two studied groups according to right ear PTA

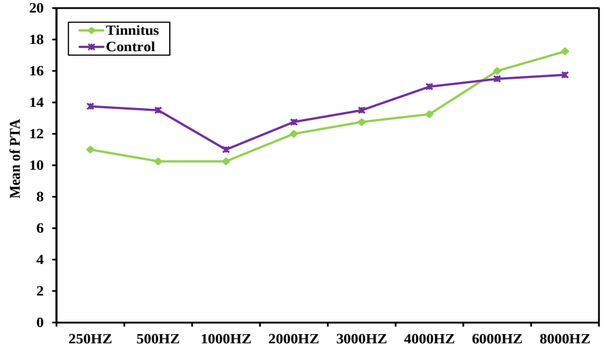

Figure 2: Comparison between the two studied groups according to left ear PTA

Table 1: Comparison between the two studied groups according to total error score

Total error score	Tinnitus (n = 20)	Control (n = 20)	t	p
Min. – Max.	0.18 – 0.60	0.04 – 0.23	9.186*	<0.001*
Mean ± SD.	0.33 ± 0.10	0.10 ± 0.05		
Median	0.32	0.10		

Table 2: Comparison between quiet and noisy condition in tinnitus and control group separately.

	Sound localization	No Noise	Noise Right	Noise Left
Tinnitus	250HZ			
	Mean ± SD.	0.19 ± 0.16	0.46 ± 0.21	0.40 ± 0.34
	Z(p)		3.028*(0.002*)	2.506*(0.012*)
	4000HZ			
	Mean ± SD.	0.31 ± 0.16	0.59 ± 0.26	0.76 ± 0.25
	Z(p)		3.290*(0.001*)	3.825*(<0.001*)
	Speech			
	Mean ± SD.	0.07 ± 0.11	0.33 ± 0.20	0.24 ± 0.20
	Z(p)		3.311*(0.001*)	3.103*(0.002*)
Control	250HZ			
	Mean ± SD.	0.02 ± 0.04	0.16 ± 0.18	0.17 ± 0.16
	Z(p)		3.055*(0.002*)	2.931*(0.003*)
	4000HZ			
	Mean ± SD.	0.07 ± 0.07	0.30 ± 0.21	0.35 ± 0.27
	Z(p)		3.529*(<0.001*)	3.381*(0.002*)
	Speech			
	Mean ± SD.	0.0 ± 0.0	0.05 ± 0.10	0.06 ± 0.12
	Z(p)		1.841(0.066)	1.841(0.066)

CONCLUSIONS

We suggest that tinnitus can interfere with sound localizationability and that interference was far worse when noise was presented.