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Study of Retro Cochlear Pathology for finding Hearing Ability using Tone Decay Test

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Abstract- Pure tone Audiometry (PTA)-Tone Decay Test is the key hearing test used to identify hearing threshold levels of an individual, enabling determination of the degree, type and configuration of a hearing loss. The test is used to indentify quickly screening for Retro Cochlear pathology. In audio logical investigations, the hearing sensitivity is tested for pure tones. The test tones of different frequencies and levels are generated and presented to the patient and hearing thresholds are determined on the basis of patient's response. Thus in this work we described the auditory system and its disorders.

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Keywords: audiometer, pure tone decay.

I. Introduction

This work is able to 'Measure of hearing ability of persons using pure Tone Decay Test. Hearing ability differs from person to person. The human ear is most sensitive. Hearing problems increases with age as well as sound pollution. It results in temporary hearing loss. This can be reversed with proper medication or treatment. It occurs when there is difficulty with at least one part of the ear, resulting in an individual hearing some sounds or none at all.This study shows group people like senior citizens of our nearby area, Around 20 persons attended hearing ability test. Result shows that the peoples of this age group have different ear sensitivity. For this test ELKON EDA 3N3 AUDIO-METER is used to perform Tone Decay Test & results are concluded.

II. Methodology

Pure tone audiometry is a procedure for determination of the extent of hearing loss and the cause, i.e. conduction or sensorineural loss. The subjects hearing threshold for acoustic stimuli of different frequencies are measured. The initial level of the stimuli is selected by the audiologist.

a) Tone Decay Test

Of all the auditory tests designed for detection of the site of pathology in the sensorineural pathway, the tone decay test is the most commonly used, because the test can be reliably carried out on any pure tone audiometer. It has been statistically shown that pathology in the auditory nerve causes an abnormally rapid deterioration in the threshold of hearing of a tone if presented continuously to the ear. In this test, we try to quantify the deterioration in the auditory nerve. This test can be carried out with or without detecting the hearing threshold of the subject.

b) Overall Result for Tone Decay Test

- Negative-If patient responed for full 60 seconds
- Positive-If patient has failed to respond for the full 60 seconds.

Object	Age	Treshold		Intensity for Tone Decay		Loudness Level	Remarks
		Left	Right	Left	Right		
1	74	75	70	95	90	Sound heard for all Frequencies	NEGATIVE
2	70	60	55	80	75	Sound heard for all Frequencies	NEGATIVE
3	64	70	65	90	85	AT 95 dB to ne Decay Present	POSITIVE TONE DECAY
4	66	45	55	65	75	Sound heard for all Frequencies	NEGATIVE
5	72	80	55	110	75	AT 95 dB to ne Decay Present	POSITIVE TONE DECAY
6	84	75	65	95	85	AT 2 KH_Z, 90 dB Tone decay Present	POSITIVE TONE DECAY
7	88	60	45	80	65	Sound heard for all Frequencies	NEGATIVE
8	67	55	55	75	75	AT 2KH_Z, 80 dB Tone decay Present	POSITIVE TONE DECAY
9	71	35	30	55	50	Sound heard for all Frequencies	NEGATIVE
10	62	50	60	70	80	Sound heard for all Frequencies	NEGATIVE
11	65	50	50	70	70	Sound heard for all Frequencies	NEGATIVE
12	68	40	35	60	55	Sound heard for all Frequencies	NEGATIVE
13	78	55	50	75	70	Sound heard for all Frequencies	NEGATIVE
14	66	35	40	55	60	Sound heard for all Frequencies	NEGATIVE
15	66	70	60	90	80	Sound heard for all Frequencies	NEGATIVE
16	74	65	60	85	80	Sound heard for all Frequencies	NEGATIVE
17	66	70	70	90	90	AT 2KH_Z, 60 dB Tone decay Present	POSITIVE TONE DECAY

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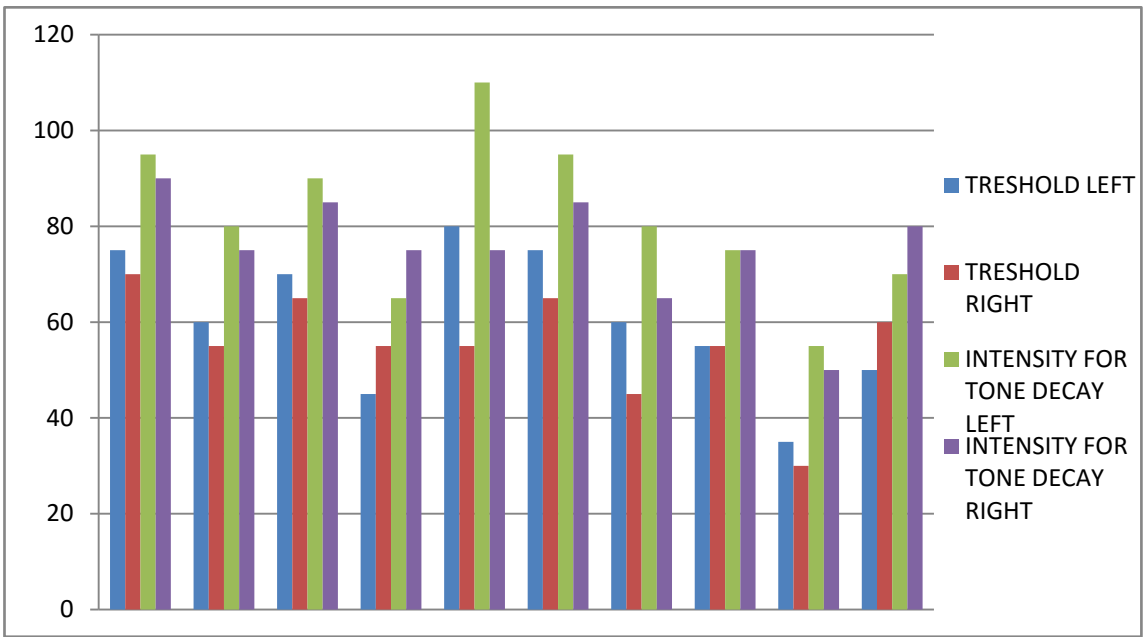
III. Graph & Conclusion

"ELKON EDA 3N3D DIAGNOSTIC Audiometer" is used for this work. It is computerized device. The invention of this device is credited by ELKON COMPANY.



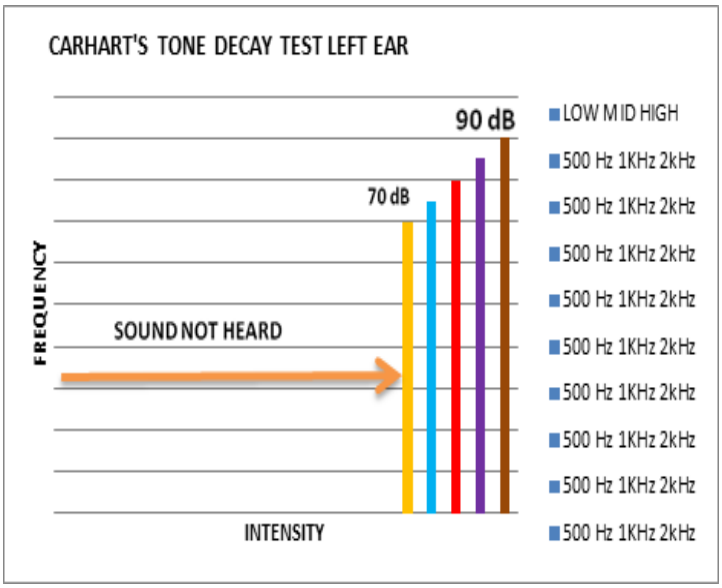
1. Carhart's Tone Decay Test (1957):

In this Test first Select the frequency & set the intensity at 5dB SL, then .Instruct the patient to raise his hand or press patients switch as long as he hears the signal. Even if the tonality of the signal changes to buzzing sound the patient should lower his hand or release the patient signal switch.

In this test the goal is to reach the intensity level at which the tone sensation & tonal quality is maintained during full 60 seconds.

Result: Values above 40 dB indicate neural losses.

CARHART TONE DECAY	FREQUENCY			INTENSITY LEFT
Patient 1	LOW	MID	HIGH	
AGE=64 YRS	500 Hz	1KHz	2kHz	
	500 Hz	1KHz	2kHz	
	500 Hz	1KHz	2kHz	
	500 Hz	1KHz	2kHz	
	500 Hz	1KHz	2kHz	
	500 Hz	1KHz	2kHz	
	500 Hz	1KHz	2kHz	
	500 Hz	1KHz	2kHz	
	500 Hz	1KHz	2kHz	
	500 Hz	1KHz	2kHz	
	500 Hz	1KHz	2kHz	
	500 Hz	1KHz	2kHz	
	500 Hz	1KHz	2kHz	
	500 Hz	1KHz	2kHz	
	500 Hz	1KHz	2kHz	70
	500 Hz	1KHz	2kHz	75
	500 Hz	1KHz	2kHz	80
	500 Hz	1KHz	2kHz	85
	500 Hz	1KHz	2kHz	90



REMARK: Intensity level at which the tone sensation & tonal quality is maintained during full 60 sec is above 40 dB. It indicates Neural Loss

2. Rosenbrg Tone Decay Method:

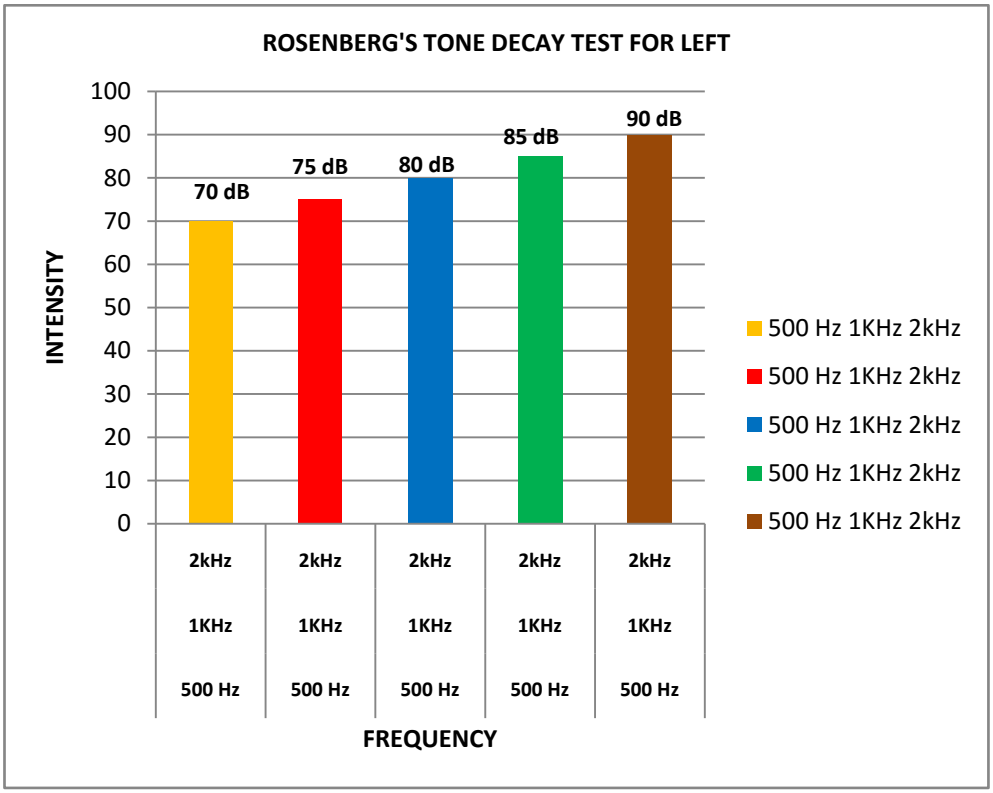
Procedure:

1. Starting intensity level is threshold.
2. Stimulation is continued up to 60 sec during which the intensity is increased whenever the patient fails to perceive the tone.
3. Adaptation value will correspond to the intensity increases during this one minute.

Result:

I. Normal value- 0 to 10 dB decay within 60 seconds
II. Cochlearlosses- 15 to 20 dB decay within 60 seconds.
III. Neurallosses -30 dB or greater within 60 seconds.

ROSENBERG	FREQUENCY			TRESHOLD dB
Patiant2	LOW	MID	HIGH	LEFT
AGE=64	500 Hz	1KHz	2kHz	70
	500 Hz	1KHz	2kHz	75
	500 Hz	1KHz	2kHz	80
	500 Hz	1KHz	2kHz	85
	500 Hz	1KHz	2kHz	90



REMARK: Left Ear Treshold is 70 dB & Intensity for Tone Decay is 90 dB , therefore decay show range 30 dB.So indicates Neural Loss.

3. Owen's Tone Decay Method:

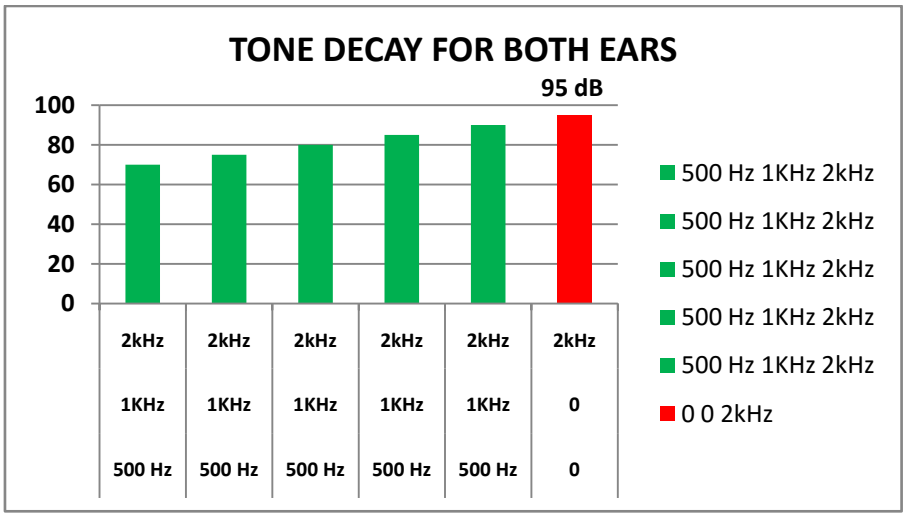
It starts at Threshold; the difference is that 20 seconds rest period is advised previous to subsequently 5dB increment.

Result:

I. Normal Values -5dB decay
II. Cochlear losses-10 to 20 dB decay
III. Neural loss-25 dB or greater decay

Tone decay Test for object No 3: OWEN'S METHOD

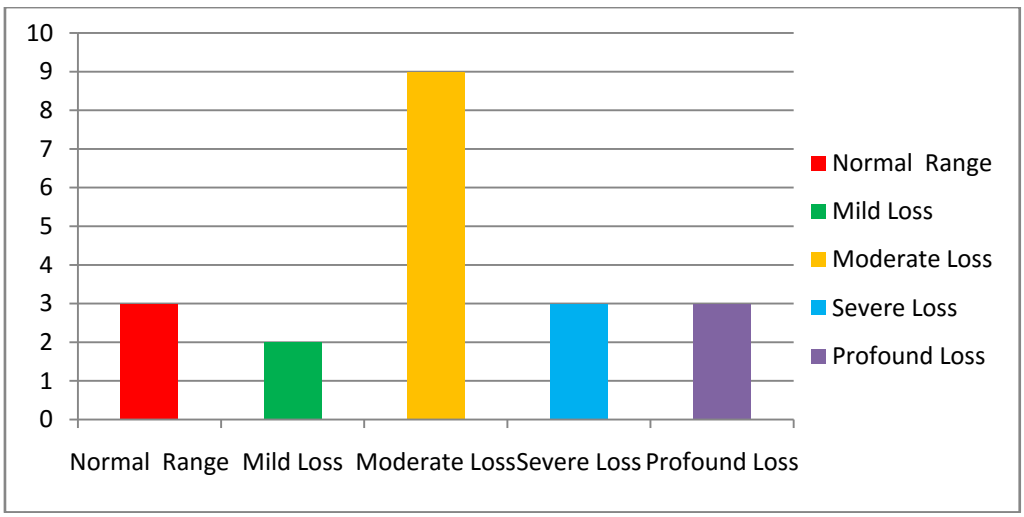
TONE DECAY	FREQUENCY			TRESHOLD
	LOW	MID	HIGH	LEFT
	500 Hz	1KHz	2kHz	70
	500 Hz	1KHz	2kHz	75
	500 Hz	1KHz	2kHz	80
	500 Hz	1KHz	2kHz	85
	500 Hz	1KHz	2kHz	90
	0	0	2kHz	95



REMARK: Each reading has taken with 20 sec rest period, Intensity level at which the tone sensation & tonal quality is maintained during full 60 sec is above 25 dB. It indicates Neural Loss.

OVERALL REMARK:

Range	Title	Sub No
0-20 dB	Normal Range	3
20-40 dB	Mild Loss	2
40-70 dB	Moderate Loss	9
70-90 dB	Severe Loss	3
90 db above	Profound Loss	3



IV. Conclusion

1. In this paper i have studied the 17 objects & Conclude the results for left and right ears, generally it is found that RIGHT ear has more hearing power as compare to LEFT ear.
2. All the tests are carried out for air conduction.
3. All the testes are carried out for evaluation of whole ear systems probably for outer ear, middle year, inner ear.
4. Aaged group people found Moderate Hearing Loss.
5. I have performed 3 tone decay test for each object out of which 4 are affected by Tone Decay.
6. If the test comes positive then the losses are found out &the object is suspected for Retro cochlear Pathology.

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