

**SPEECH AUDIOMETRY TECHNIQUE USED FOR DETECTING HEARING LOSS**

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**Abstract**

Speech audiometric assesses a patient's auditory ability using words, *which are much more representative of everyday listening experience than pure tones*. Measuring the ability to perceive speech gives the clinician a clearer picture of the patient's *functional hearing ability* and is extremely valuable to predict a patient's *success with hearing aids*. In this work Speech audiometry tests are presented as *"monitored live-voice" and by using pre-recorded test materials*. Speech audiometry is used to measure the ability of a patient to perceive speech signals. Speech materials (pre-recorded or read by examiner) are presented; the patient repeats the speech materials to determine how well it was perceived. Data is collected for PTA readings of 100 boys and girls students and the results are discussed with PTA reflects SRT which indicates hearing loss, and WRT also shows the difficulty in hearing. I have used "ELKON EDA 3N3D DIAGNOSTIC AUDIOMETER", It is computerized device. I have measured hearing ability of persons of two age groups. Our college students i.e. 50 girl & 50 boys,

*Keywords*-PTA, SRT, WRT

**Introduction**

Speech Audiometric Tests are used To measure the patient's ability to recognize speech stimuli and To confirm PTA results. Speech Audiometry Tests are Basically Speech Detection Threshold (SDT), Speech Recognition Threshold (SRT), (Speech Discrimination Test SDT) or (Word Recognition Score WRS),. Others

In Speech Detection Threshold (SDT) test The lowest level at which the presence of a speech signal can be heard 50% of the time. (The listener can tell that something is there)

The listener does not have to identify the material as speech, but must indicate awareness of the presence of sound. similarly In Speech Awareness Threshold (SAT): The speech awareness threshold is a commonly used synonymous term for speech detection threshold. Speech detection threshold is the more accurate term because it specifies the listener's task. Speech recognition threshold (SRT) is the most frequently used speech threshold test. It is a measure of the intensity level at which the listener is able to *correctly repeat 50% of words presented*. This level should correspond roughly to the average of the pure tone audiometric thresholds at 500, 1000 and 2000 Hz. When the pure tone audiogram is steeply sloping (high frequency hearing loss), the SRT corresponds better with either the best two of three pure tone average (PTA) frequencies (500, 1000 & 2000 Hz) or the best one of these three frequencies. The SRT is generally conducted using *spoon-dee words* i.e. single words that comprise two syllables with equal emphasis placed on each syllable. And Supra-Threshold

Recognition Tests (Speech Discrimination Test SDT) Word Recognition Score WRS or Sentence Recognition Score test is used for speech audiometric results.

### THEORY

The causes of hearing loss are due to

- Maternal infections such as rubella, herpes, toxoplasmosis, syphilis, cytomegalovirus (CMV)
- Heredity (genetics)
- Asphyxia or lack of oxygen at birth
- Possible association with birth weight of less than 1,500 grams
- Possible association with defects of the head and neck
- Possible association with maternal drug or alcohol abuse

Later onset (can occur any time after birth):

- Bacterial meningitis
- Ototoxicity (drug induced)
- Intense or excessive noise
- Physical trauma to the head or ear
- Aging (the most common cause in older adults)

The following characteristics are typical of sensorineural hearing loss: Students with a sensorineural hearing loss may experience both distortion and decreased loudness of sounds. This occurs because some or all of the hair cells in the inner ear responsible for sensing sounds of different pitches are damaged or nonexistent or because the auditory nerve (the pathway for sound to travel to the brain) is damaged or nonexistent. The extent of damage to the hair cells in the cochlea and the auditory nerve will cause varying degrees and patterns of hearing loss.

The following audio logical tests are re-commended following a detailed history and clinical examination: speech audio metry

#### *Monitored live-voice testing*

The test administrator presents speech materials through a microphone that is connected to a VU meter which measures the intensity level of the voice .

The average output level at the transducer is controlled via the audiometer, but fluctuations in signal intensity are a function of fluctuations in the live-voice intensity. The *advantages* of monitored live-voice testing are that it is easy to administer, and allows flexibility of the test procedure. The *disadvantages* are the lack of precise control over the signal intensity, along with variations that occur across test administrators - different clinicians testing the same patient with the same test materials might yield large differences in results due to individual differences in the testers' voice frequencies and pronunciations.

#### *Pre-recorded materials:*

Pre-recorded speech materials are recorded in an ideal acoustic environment, digitally edited, and presented via a CD-player or personal computer through the auxiliary input of the audiometer. *Advantages* include test-retest reliability of the materials, as well as a greater degree of control of

signal intensity. *Disadvantages* include the effort required to produce such materials and the lack of flexibility in terms of the time intervals between presentations of individual test items (words). Two speech tests that are commonly used in clinical practice, i.e. the speech reception or recognition threshold (SRT), and the speech discrimination score; the author also describes the test procedures as well as the interpretation of the results.

**Methodology**

In this paper we use "SPEECH AUDIOMETRY TECHNIQUE FOR HEARING LOSS". I have used "ELKON EDA 3N3D DIAGNOSTIC AUDIOMETER", It is computerized device. I have measured hearing ability of persons of two age groups. Our college students i.e. 50 girl & 50 boys,

**Experimental Procedure:**

1. No specific steps
2. We can using ascending or descending method (descending "10 dB down & 5 dB up" and ascending "10 dB up & 5 dB down")
3. We can just call the person by his /her name or give them familiar words, nonsense words. Syllables, phrases, sentences, or running speech ( running speech and sentences are more preferable)
4. Conducted by head phone or speakers
5. Pt. just detect or not the presence of the speech even without repeating it correctly by verbal , hand signal, or push the buttons.

**Materials**

Spondaic Words: which are 2-syllable words that have equal stress on both syllables "can be divided into 2 monosyllables"

E.g. pancake, base ball, birthday, eardrum,

There is no standard or guideline that stipulates which words should be used to obtain the SRT. ASHA guidelines do recommend familiarizing the patient with the spondaic words that will be used (ASHA Committee on Audiologist Evaluation, 1988). **Response Format is used as open set and closed set. following Instructions are follows during observation**  
 1- Instruct the pt. about (by press TALK FORWARD button or face to face) **the nature of the test and mode of response selected and ask patient to respond even when the stimuli are soft.**

**Observation table OF GIRLS:**

All observation are carried out for air conduction.

NAME OF PATIENT	AGE	GENDER	PURE TONE AVERAGE IN db/ PTA	
			Right ear	Left ear
1	19	F	10	15
2	31	F	20	25
3	19	F	30	30
4	24	F	15	10
5	20	F	20	25

Continue readings

MASKING	STARTING DB	DECREASING THE DB TO FIND SRT				
PATIENT 1						
LEFT	30	30	25	20	15	NOT PRPOER
RIGHT	30	30	25	20	15	NOT PRPOER
PATIENT 2						
LEFT	40	40	35	30	25	20
RIGHT	45	40	35	30	25	NOT PRPOER
PATIENT 3						
LEFT	50	50	45	40	35	NOT PRPOER
RIGHT	50	50	45	40	NOT PROPER	NOT PRPOER
PATIENT 4						
LEFT	35	35	30	25	20	NOT PRPOER
RIGHT	30	30	25	20	NOT PROPER	NOT PRPOER
PATIENT 5						
LEFT	40	40	35	30	25	NOT PRPOER
RIGHT	45	45	40	35	30	NOT PRPOER

CONTINUE READING:

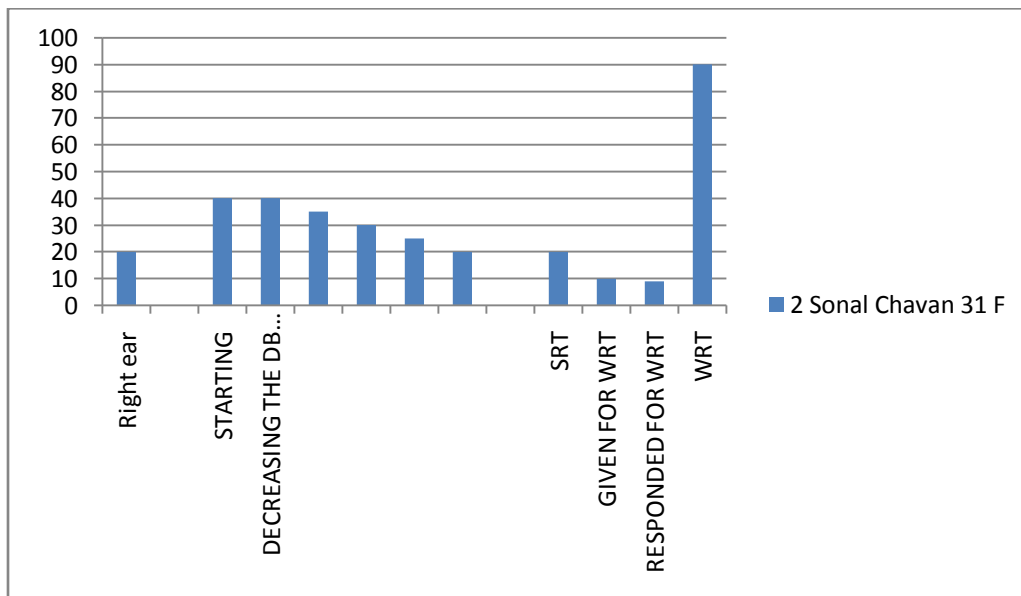
FOR SRT NUMBER OF GIVEN WORDS AND UPTO WHICH THEY ARE RESPONDE	SRT db	FOR WRT GIVEN WORDS AND RESPONSE		WRT IN %
	SRT	GIVEN	RESPONS	WRT
up to 15 correct all words below it not possible	15	10	10	100
up to 15 correct all words below it not possible	15	10	9	90
up to 20 correct all words below it not possible	20	10	9	90

up to 25 correct all words below it not possible	25	10	8	80
up to 35 correct all words below it not possible	35	10	7	70
up to 40 correct all words below it not possible	40	70	6	60
up to 20 correct all words below it not possible	20	10	8	80
up to 20 correct all words below it not possible	20	10	8	80
up to 25 correct all words below it not possible	25	10	8	80
up to 30 correct all words below it not possible	30	10	7	70

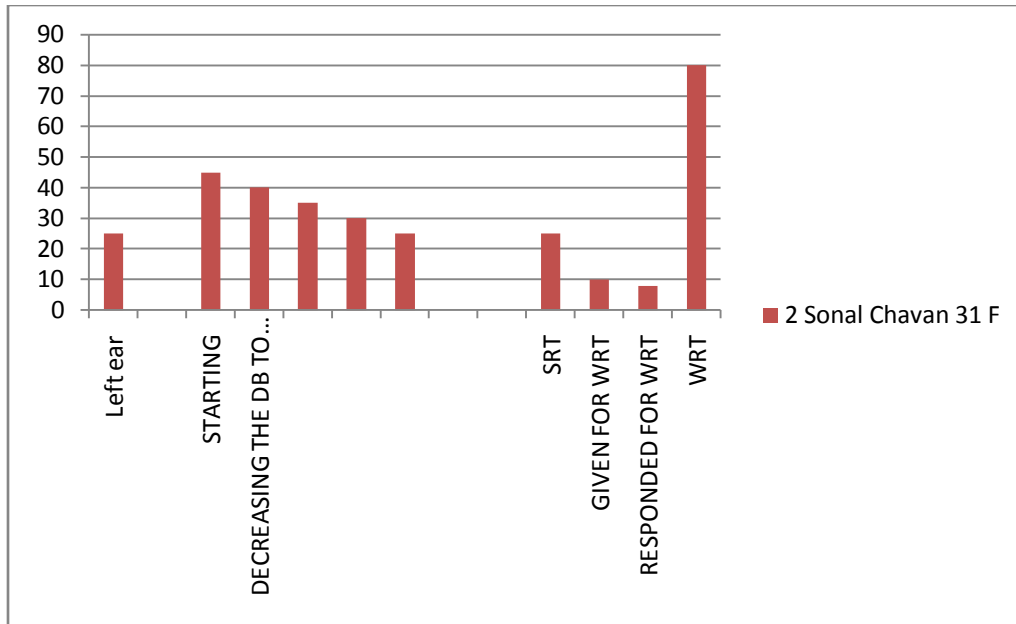
PATIENT NAME: 2 Sonal Chavan

AGE: 31

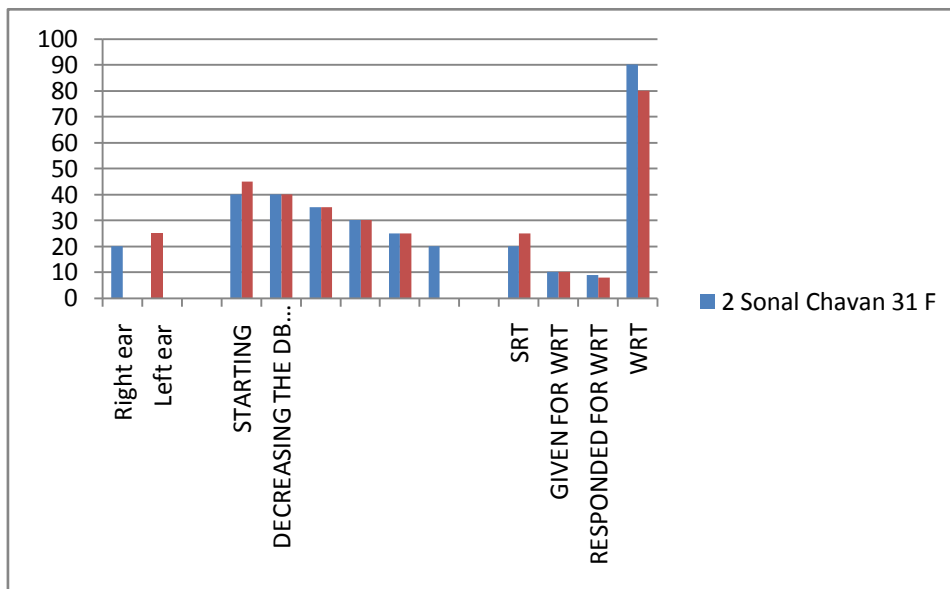
GENDER: F



1. It shows percent WRT for Right Ear.
2. Intensity for right ear is 20 Db
3. Initial reading starts with adding 20 db extra i.e 40 db
4. speech recognition threshold is observe at 20 db



1. It shows percent WRT for Left Ear.
2. Intensity for left ear is 25 Db
3. Initial reading starts with adding 20 db extra i.e 45 db
4. speech recognition threshold is observe at 25 db

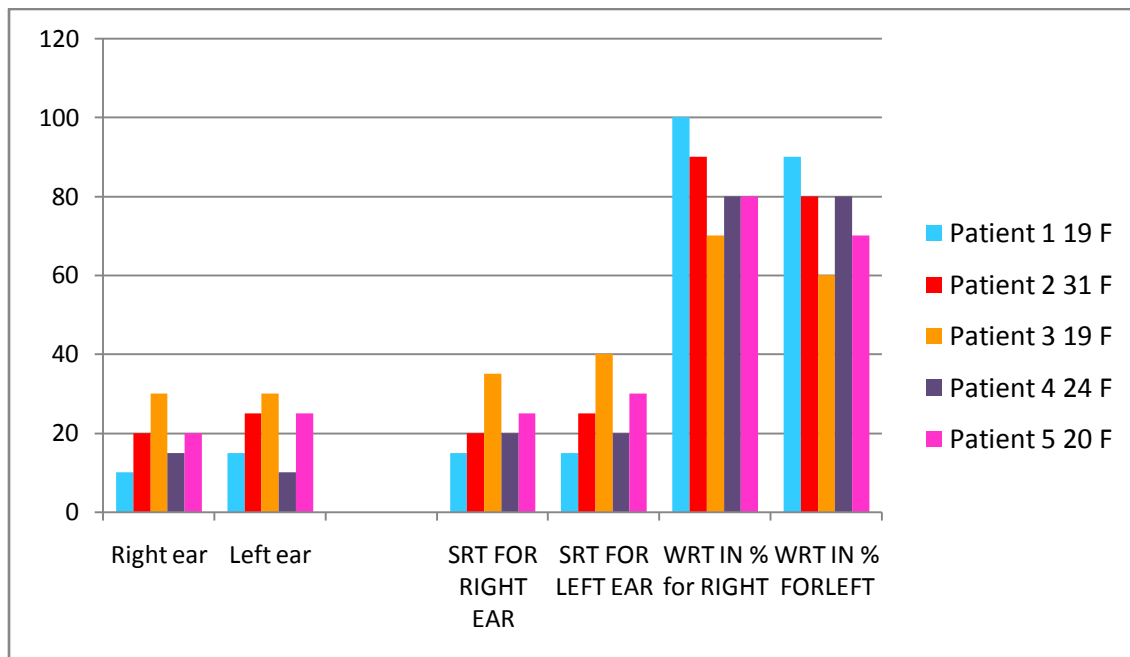


- 1 Comparison of right & left ear indicate threshold of both ear is different.
1. The SRT of both ear is nearly equal .
2. Also WRT is also good for right ear as compare to left.

CONCLUSION:

1. From above we say that sensitivity of right ear is within normal limit.
2. The sensitivity of left ear is just exceeds the limit by 5dB, which show mild hearing loss.
3. WRT for right ear is in the normal range.
4. WRT for left ear is slight difficult.
5. Normal hearing range is also within limit for right ear, but hearing range of left ear is exceeds by 5dB which show mild hearing loss.

Observation table for GIRLS:



- In all the cases right ear is more sensitive as compare to left ear.
- There are two patient shows the mild hearing loss above 20 dB.
- The pure tone average of 1st patient shows good correlation with SRT and WRT, so there is no any hearing loss.
- for patient 2, the pure tone average is within limit and SRT crosses the just plus minus 5 dB it's ok, WRT of this patient shows the slightly difficulty in hearing.
- The 3 rd patient shows the mild hearing loss in both ear , SRT also shows the mild hearing loss, WRT also shows the mild hearing loss.
- The 4th patient PTA is within limit, SRT also in within limit, but WRT shows the slightly difficulty in hearing.

- Patient 5th indicates the mild hearing loss for left ear, right is normal, but form SRT both ear indicates mild hearing loss, and WRT also shows the mild hearing loss.
- This 3rd patient indicates the conductive hearing loss which is related to outer and middle ear for both ear .
- Patient 2 also indicates conductive hearing loss for left ear .

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