

# Incidence of Temporary Threshold Shift after MRI (Head and Neck) In Tertiary Care Centre

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## Abstract:-

### ➤ Introduction

Magnetic Resonance Imaging(MRI) is used for diagnostic purposes. It's characteristic noise can be harmful for people operating the MRI machine as well as the patients who are undergoing MRI scan. This can lead to development of changes in health like anxiety, high blood pressure, tachycardia, irritability by patients, temporary threshold shift(TTS). As per this, higher the resolution of scan, high Tesla MRI machine needed which in turn translates into higher production of sound. TTS is a condition in which there is temporary shift in auditory threshold. This happens when there is loud exposure of noise for short or long period. TTS can occur for minutes or hours or days, but the shift of the threshold comes to baseline after sometime, when person is secluded from the loud noise.

PTA (pure tone audiometry) provides ear specific thresholds, and uses frequency specific pure tones to give place specific responses, so that the configuration of a hearing loss can be identified. Increase in stiffness of middle ear causes low frequency hearing loss whereas increase in mass effect of middle ear causes high frequency hearing loss.

### ➤ Aim

Incidence of temporary threshold shift after MRI (head and neck) in tertiary care centre.

### ➤ Objective

- To do a pure tone audiogram in patient before MRI
- To do a pure tone audiogram in patient immediately after MRI
- To do pure tone audiogram in patient 1 day after MRI.

### ➤ Methodology

A cross-sectional study was done to analyse the pure tone audiogram results of patients before and after doing MRI scan. 40 patients undergoing MRI scan above 16 years till 50 years who came to Saveetha Medical College ENT audiology were included in the study. All patients who are medically unstable or unconscious or history of previous ear disease were excluded from the study. Statistical analysis Paired t test was done.

### ➤ Result

The value is strongly significant which tells us that there is temporary threshold shift after MRI. It was confirmed by paired t test.

### ➤ Conclusion

In my study the test value is significant which suggests of temporary threshold shift after MRI. The threshold shift is measured in above study by using pure tone audiometry at different frequencies (500Hz, 1KHz, 2KHz).

## I. INTRODUCTION

Magnetic resonance imaging(MRI) is used for diagnostic purposes. The machine produces noise which can be harmful for people operating the MRI machine as well as the patients who are undergoing MRI scan. This can lead to development of changes in health like anxiety, high blood pressure (bp), tachycardia, irritability by patients, temporary threshold shift(TTS) or permanent threshold shift(PTS). Noise is produced by magnetic field which causes vibration. As for the high resolution imaging, the MRI machine is classified as 1.5 Tesla, 3 Tesla. As per this, higher the resolution of scan, high Tesla MRI machine needed which in turn translates into higher production of sound.

MRI is contraindicated in old people, ear diseases, ear discharge, ear ossicle replacements, 8<sup>th</sup> nerve palsy.

TTS is a condition in which there is temporary shift in auditory threshold. This happens when there is loud exposure of noise for short or long period. TTS can occur for minutes or hours or days, but the shift of the threshold comes to baseline after sometime, when person is secluded from the loud noise.

Pure tone audiogram is a hearing test. It is more superior than any other hearing test because PTA provides ear specific thresholds, and uses frequency specific pure tones to give place specific responses, so that the configuration of a hearing loss can be identified. Increase in stiffness of middle ear causes low frequency hearing loss whereas increase in mass effect of middle ear causes high frequency hearing loss.

These PTA tests are used to check the temporary threshold shift after getting exposed to high frequency noise for a period. There will be temporary threshold shift or hearing loss.

- *Aim*
  - Incidence of temporary threshold shift after MRI (head and neck) in tertiary care centre.
- *Objective*
  - To do an pure tone audiogram in patient before MRI
  - To do an pure tone audiogram in patient immediately after MRI
  - To do pure tone audiogram in patient 1 day after MRI.

- Study design is
  - Sampling is 40
- Study setting is
  - INCLUSION CRITERIA:- patient undergoing MRI scan above age 16 years -50 years.
  - EXCLUSION CRITERIA:- patients who are medically unstable or unconscious or history of previous ear disease.

**II. METHODOLOGY**

To analyse the pure tone audiogram results of patients before and after doing MRI scan. who fits into the inclusion criteria

**III. RESULTS**

The value of pure tone audiometry varies from 6.6db to 30db before and after MRI. The Test value is significant as it shows there is temporary threshold shift after MRI. The value is strongly significant.

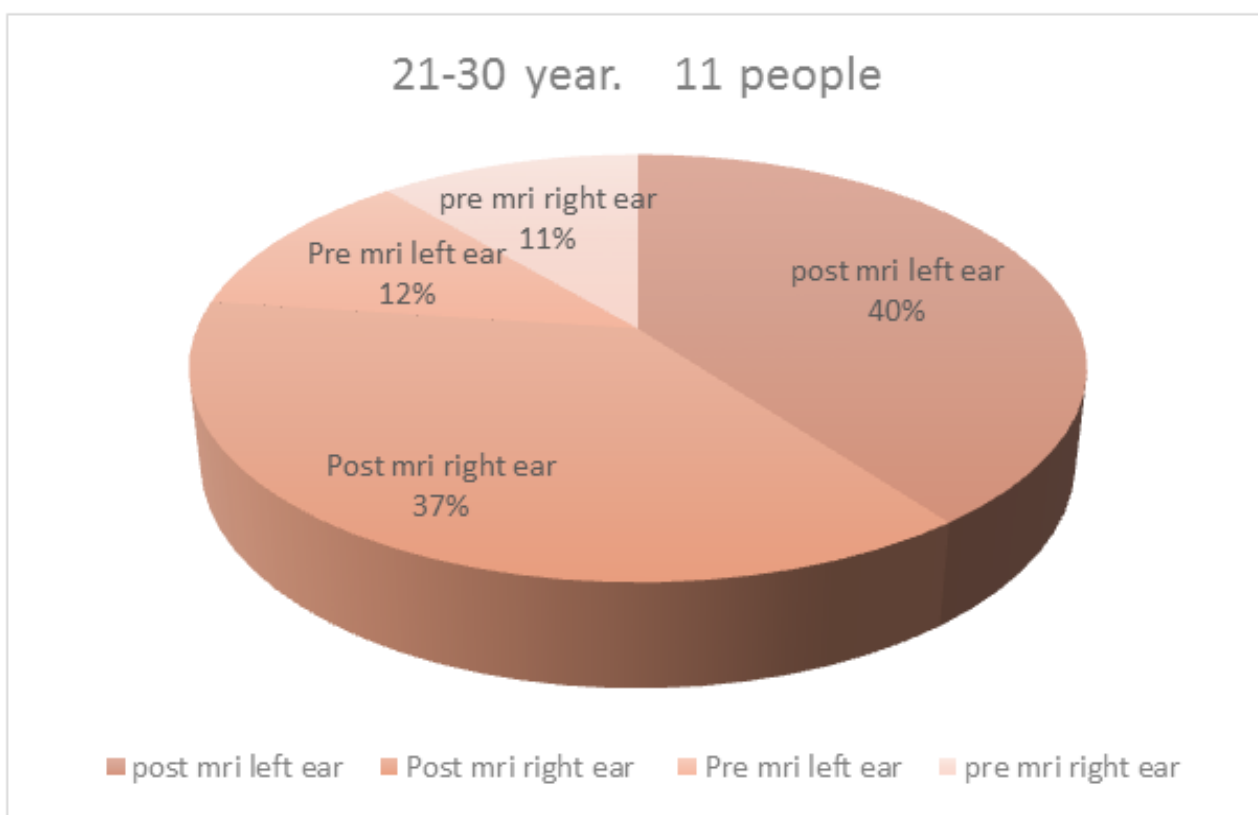


Fig 1:- “Pie chart one show that the age group from 21 to 30 year In 11 people the hearing or frequency varies. The minimum Frequency was 8db in pre MRI right ear and highest is 26.6 dB in post MRI in right side 8.3 in pre MRI left ear and Maximum is 28.3 in post MRI left ear.”

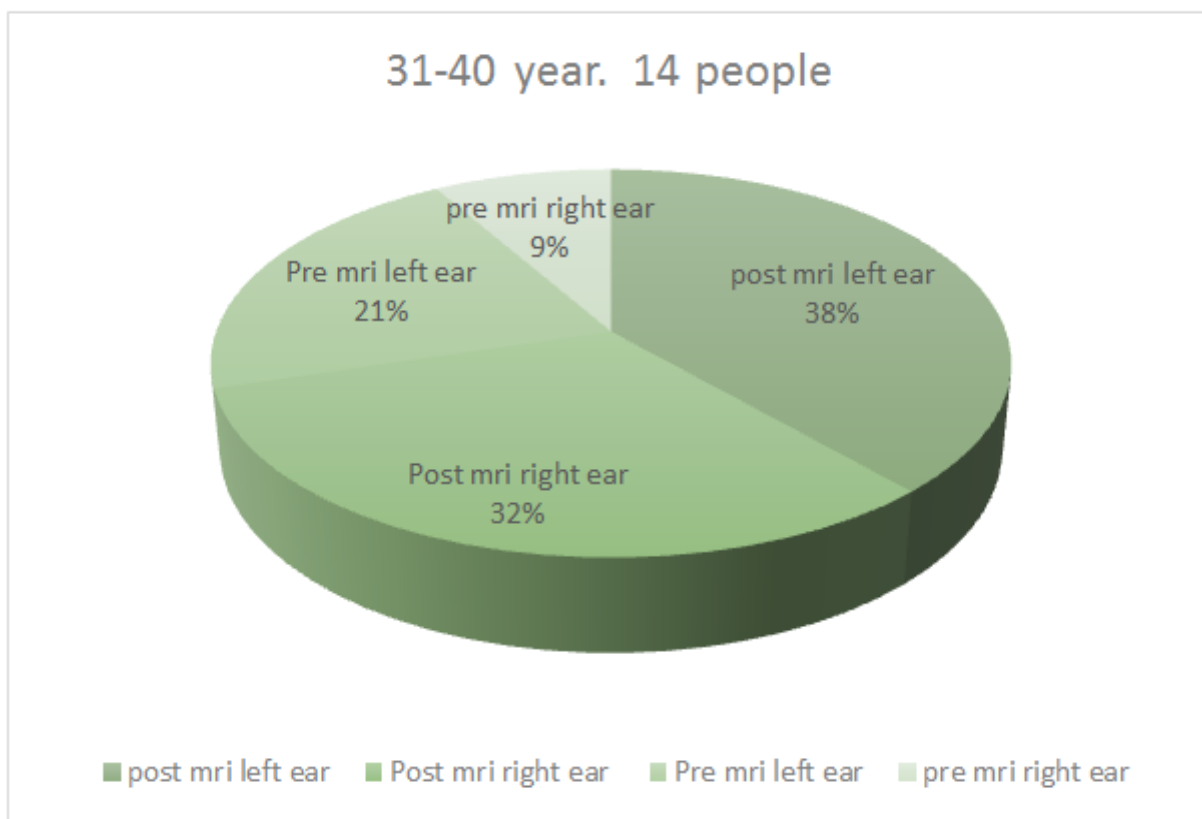


Fig 2:- “Pie chart two show that the age group from 31 to 40 year In 14 people the hearing or frequency varies the minimum Frequency was 6.6 dB in pre MRI right ear and highest is 25 dB in post MRI in right side 16.6 dB in pre MRI left ear and Maximum is 30 dB in post MRI left ear.”

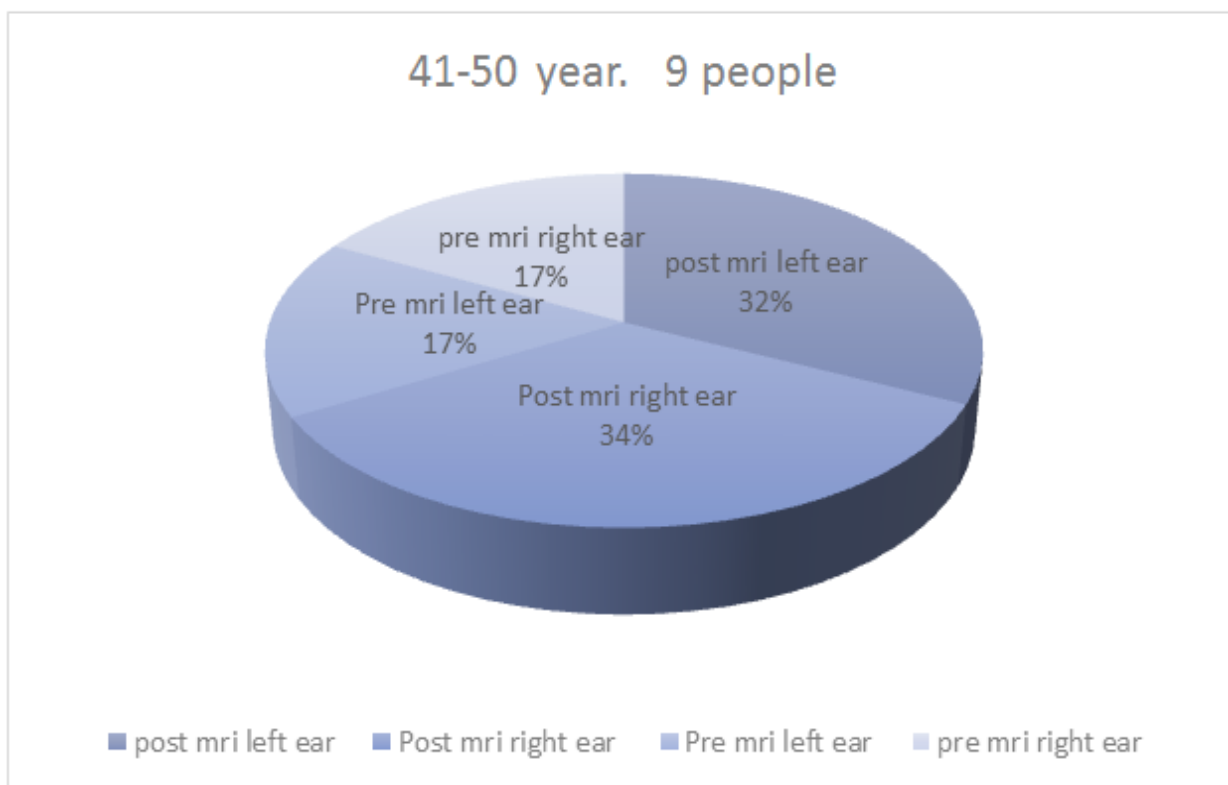


Fig 3:- “Pie chart three show that the age group from 41 to 50 year In 9 people the hearing or frequency varies the minimum Frequency was 15 dB in pre MRI right ear and highest is 30 dB in post MRI in right side 14.33 dB in pre MRI left ear and Maximum is 28.3 dB in post MRI left ear.”

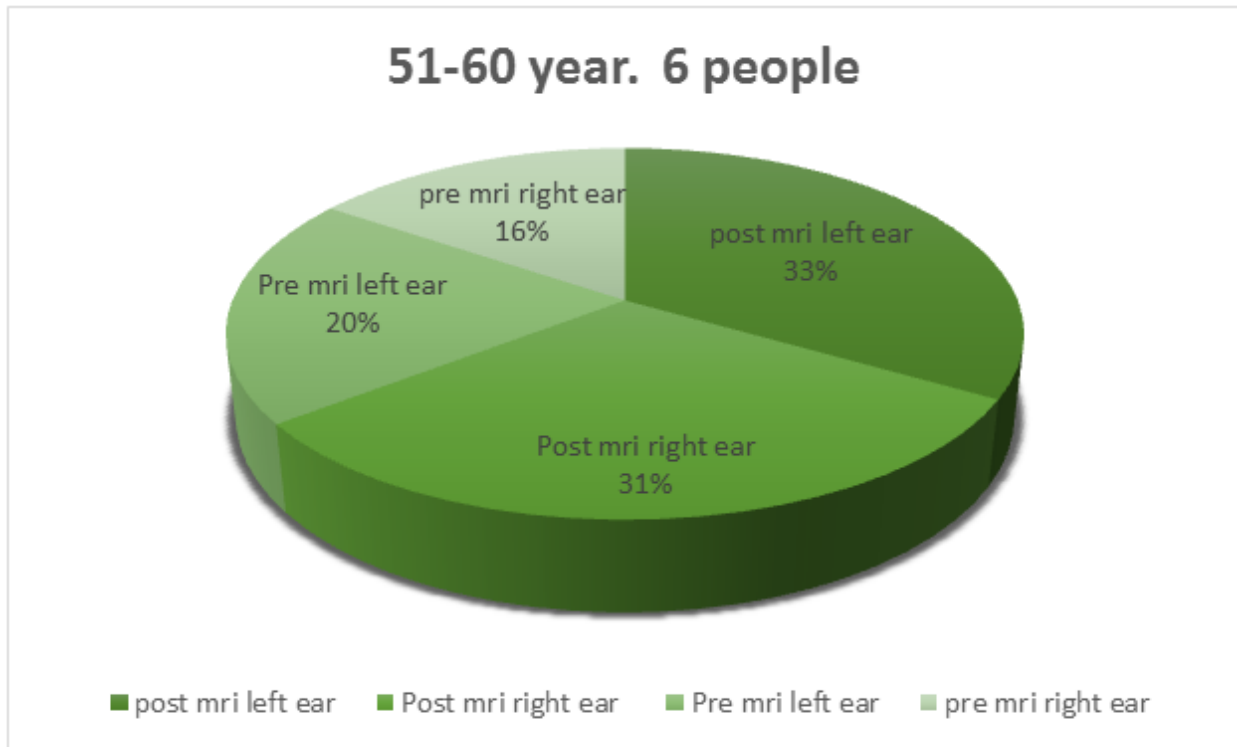


Fig 4:- "Pie chart four show that the age group from 51 to 60 year In 6 people the hearing or frequency varies the minimum Frequency was 11.6 dB in pre MRI right ear and highest is 23.3 dB in post MRI in right side 15 dB in pre MRI left ear and Maximum is 25 dB in post MRI left ear."

#### IV. DISCUSSION

In the MRI noise is produced due to current in gradient coil of machine.

Hair cells are damaged due to noise. It is sensor-neural loss of hearing mostly bilateral[1]. Magnetic field ranging from 1 Tesla to 1.5 Tesla[2]. Higher the noise produced by MRI More loss of hearing is there. More studies have shown that the more the duration for MRI scan more is the hearing loss[3]. Noise produce by the MRI is not more than 4kHz.

Patient who didn't had any hearing problem and did MRI scan for other purpose so after the scan they developed temporary hearing loss either unilateral or bilateral. If any hearing loss is there they can be treated earlier and hearing loss can be prevented. During MRI scan we can give noise cancellation headphones which will prevent hearing loss to certain extend[4]. To prevent hearing loss patient should be minimally exposed means time duration should be less so that hearing loss will not occur.

Before and after MRI pure tone audiogram is done to check the shift in hearing threshold[5]. PTA was done at frequencies 500Hz, 1000Hz,2000Hz. Many people value was significant in pure tone audiometry. Hearing loss is prevented by protecting ear[3].

The result value in my study is done with the Paired test and the value is significant which means there is temporary threshold shift is there after MRI.

#### REFERENCES

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