

Sensorineural Hearing Loss in Rheumatoid Arthritis

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ABSTRACT

Introduction: Rheumatoid arthritis (RA) is a chronic multisystem disease of unknown etiology is characterized by persistent inflammatory synovitis, usually involving peripheral joints in a symmetric distribution. RA is well known to affect many organ systems, including the auditory system and can involve the incudomalleolar and incudostapedial joints altering the ossicular mechanics in response to static air pressure modifications.

Objective: This study evaluates the degree of sensorineural hearing loss in patients with rheumatoid arthritis (RA)

Material and Methods: This study was conducted in the Department of Physiology in collaboration with departments of Medicine and ENT Pt. B.D. Sharma PGIMS, Rohtak. 25 rheumatoid arthritis female patients with disease duration of more than five years as per 1987 criteria of American college of rheumatology were included in the study to study the effect of rheumatoid arthritis on hearing. 25 healthy volunteer females were included in control group. Audiological evaluation was based on pure tone audiometry.

Results: We observed a high incidence of hearing loss in rheumatoid arthritis patients as compared to corresponding age and sex matched controls. Nine RA (36%) cases, were having hearing threshold more than 25 dB. Of the total of 36% patients having hearing loss 24% patients had sensorineural hearing loss. Bilateral hearing loss was seen in 8% of cases.

Conclusion: Based on our study it can be postulated that patients with RA are at higher risk of hearing impairment.

Keywords: Rheumatoid arthritis, hearing, sensorineural, audiometry

INTRODUCTION

Rheumatoid arthritis (RA), a chronic multisystem disease of unknown etiology is characterized by persistent inflammatory synovitis, usually involving peripheral joints in a symmetric distribution. The potential of the synovial inflammation to cause cartilage damage, bone erosions and subsequent changes in joint integrity is the hallmark of the disease. Onset is most frequent during the fourth and fifth decades of life with 80% of patients developing the disease between the age of 35 to 50 years. [1] RA is a systemic disease often associated with cutaneous and organ-specific extra-articular manifestations (EAM). [2] Rheumatoid

arthritis is well known to affect many organ systems, including the auditory system and measures of hearing may be related to indices of RA disease activity. [3] It can involve the incudo-malleolar and incudo-stapedial joints altering the ossicular mechanics in response to static air pressure modifications. These joints are true diarthroses and therefore subject to the same rheumatic lesions as any other articulation in the body. [4] Perisacral tissue surrounding the endolymphatic sac contains the necessary components for an immunological reaction. In addition, the inner ear is capable of producing an autoimmune response to sensitized cells that can enter the cochlea

from the circulatory system through the spiral modiolar vein.^[5] Pure tone audiometry is the gold standard for diagnostic audiological testing. From pure-tone air conduction (AC) and bone conduction (BC) thresholds, the degree or magnitude, configuration and type of hearing loss are determined. AC thresholds assess the entire auditory pathway.^[6]

Aim & Objective

This study evaluates the degree of sensorineural hearing loss in patients with rheumatoid arthritis (RA.)

MATERIAL AND METHODS

This study was conducted in the Department of Physiology in collaboration with departments of Medicine and ENT Pt. B.D. Sharma PGIMS, Rohtak. 25 rheumatoid arthritis female patients with disease duration of more than five years as per 1987 criteria of American college of rheumatology were included in the study to study the effect of rheumatoid arthritis on hearing. 25 healthy volunteer females were included in control group. Audiological evaluation was based on pure tone audiometry.

Inclusion criteria: Patients of rheumatoid arthritis with disease duration of more than five years as per 1987 ACR criteria were included in the study.^[7]

Exclusion criteria: Patients with the following diseases were excluded: Ear discharge and deafness, Renal diseases, Hepatic diseases, Chronic respiratory diseases, Diabetes Mellitus, Uncontrolled hypertension and Pregnant or lactating mothers.

An informed consent was taken from the patients to participate in the study and study was well within the ethical norms.

Statistical Analysis

The data collected in the study was compiled and analyzed by using student's 't' test.

RESULT

• The difference in hearing threshold at 250 Hz of both right and left ears for air

conduction between group I (22.22 ± 2.43) and II (24.32 ± 2.49) was statistically significant ($p < 0.05$).

- The difference in hearing threshold at 500 Hz of both right and left ears for air conduction between group I (20.92 ± 2.24) and group II (22.56 ± 5.25) was statistically significant ($p < 0.05$).
- The difference in hearing threshold at 1000 Hz of both right and left ears for air conduction between group I (20.54 ± 2.26) and group II (23.58 ± 6.03) was statistically significant ($p < 0.05$).
- The difference in hearing threshold at 2000 Hz of both right and left ears for air conduction between group I (20.96 ± 2.71) and group II (23.48 ± 6.99) was statistically significant ($p < 0.05$).
- The difference in hearing threshold at 4000 Hz of both right and left ears for air conduction between group I (22.08 ± 2.92) and group II (26.88 ± 9.42) was statistically significant ($p < 0.05$).
- The difference in hearing threshold at 8000 Hz of both right and left ears for air conduction between group I (22.24 ± 3.12) and group II (28.96 ± 17.04) was statistically significant ($p < 0.05$). There was mild hearing loss at 4k and 8k frequencies.
- The difference in hearing threshold at 250 Hz of both right and left ears for bone conduction between group I (12.76 ± 3.28) and group II (14.40 ± 5.40) was statistically insignificant ($p > 0.05$).
- The difference in hearing threshold at 500 and 1000 Hz of both right and left ears for bone conduction between group I (11.24 ± 2.35 , 12.96 ± 3.13) and group II (14.50 ± 5.36 , 15.40 ± 5.51) was statistically significant ($p < 0.05$).
- The difference in hearing threshold at 2k, 4k and 8k Hz of both right and left ears for bone conduction between group I (13.52 ± 3.38 , 11.68 ± 3.30 , 11.32 ± 2.66) and group II (17.62 ± 6.38 , 17.88 ± 7.97 , 16.88 ± 9.83) was very highly statistically significant ($p < 0.001$) (Table 1).

Table 1: Comparison of hearing threshold intensity at various frequencies of air and bone conduction of right and left ear between group I and group II

Parameters	Group I(dB) (Mean ± SD)	Group II(dB) (Mean ± SD)	p value
Air conduction			
250 Hz	22.22±2.43	24.32±2.49	<0.05
500 Hz	20.92±2.24	22.56±5.25	<0.05
1000 Hz	20.54±2.26	23.58±6.03	<0.05
2000 Hz	20.96±2.71	23.48±6.99	<0.05
4000 Hz	22.08±2.92	26.88±9.42	<0.05
8000 Hz	22.24±3.12	28.96±17.04	<0.05
Bone conduction			
250 Hz	12.76±3.28	14.40±5.40	>0.05
500 Hz	11.24±2.35	14.50±5.36	<0.05
1000 Hz	12.96±3.13	15.40±5.51	<0.05
2000 Hz	13.52±3.38	17.62±6.38	<0.001
4000 Hz	11.68±3.30	17.88±7.97	<0.001
8000 Hz	11.32±2.66	16.88±9.83	<0.001

DISCUSSION & CONCLUSION

In our study hearing loss was calculated with an average of four frequencies 500 Hz, 1000Hz, 2000Hz and 4000Hz. Hearing threshold more than 25 dB was considered as hearing loss. We observed a high incidence of hearing loss in rheumatoid arthritis patients as compared to corresponding age and sex matched controls.

Nine RA (36%) cases, were having hearing threshold more than 25 dB. Of the total of 36% patients having hearing loss 24% patients had SNHL, 8% had conductive hearing loss, and 4% had mixed hearing loss. Bilateral hearing loss was seen in 8% of cases. One patient had an isolated dip at 4000 Hz but did not have hearing loss. Nine patients were having hearing loss in average of frequencies 500 Hz, 1k, 2k and 4k with an average threshold 33.18 dB with a hearing loss of 8.18 dB (mild hearing loss). However, the involvement of 8000 Hz was associated with higher hearing loss. The average hearing threshold at 8000Hz was 50 dB with hearing loss of 25dB (moderate hearing loss).

Takastu et al also demonstrated that there is increased SNHL in patients with RA, which may result from systemic inflammation and tissue injury. The frequency of SNHL in the patients with RA was higher than in normal controls (36.1% versus 13.9%).^[8]This was in accordance to our study.

Baradaranfar and Doosti in a case control study reported that most of the patients of RA with ear disorders show sensorineural hearing loss (SNHL), though conductive hearing loss (CHL) and in some of them mixed hearing loss is also observed. The authors reported that the audiometric tests in different frequencies show that hearing threshold in high frequencies specially in 8000 Hz had a significant difference between two groups, p=0.017 in right ear and p=0.003 in left ear. SNHL of the cochlear variation is a common finding in patients with RA whereas conductive loss and mixed HL also seen. SNHL may be the result of the extra-articular manifestation of the disease.^[9]

Ozcan et al in a controlled study observed 72.2% of the individuals had hearing loss in their group of 37 patients with RA. The prevalence of the hearing impairment was significantly higher in the RA group, and the majority was bilateral (P<0.001). Of the patients, 35.1% had sensorineural (SN), 24.3% had conductive loss, and 10.8% had a mixed type of hearing loss. The incidence of hearing loss in our study was less than those reported by Ozcan et al.^[10]The probable site of involvement responsible for the SNHL was the cochlea and discontinuity of the ossicles was responsible for the conductive hearing loss.

Salvinelli et al in their study evaluated the prevalence and features of hearing impairment in 28 RA patients who were subjected to pure tone audiometry at 250, 500, 1000, 2000 and 4000 Hz. Air and bone conduction thresholds and air-bone gaps were evaluated. On audiological assessment 24 RA patients showed bilateral hearing loss. Of these, 10 presented with sensorineural hearing loss, 8 with a mixed type hearing impairment and 6 with conductive hearing impairment.^[11]

Garcia et al evaluated the characteristics of hearing loss in 194 RA patients. They were subjected to pure tone audiometry and western blot for antiochlear antibodies. Sensorineural

hearing loss (SNHL) was detected in 42.7% of patients. Western blot test was positive in 12% of patients.^[12]

Magaro et al observed sensorineural hearing loss in 55% of RA patients and reported a correlation between disease activity and rheumatoid factor positivity.^[13]

Kastanioudakis et al in their study investigated the presence of sensorineural hearing loss and the possible causes for it. RA patients were subjected to pure tone audiometry, impedance audiometry, acoustic reflex, decay and acoustic reflex latency test. Sensorineural hearing loss >20dB in 44.4% and prolongation of acoustic reflex latency in 10% which was found to be correlated with temporomandibular joint involvement and the presence of rheumatoid factor was reported. Inner ear involvement in RA was shown by mild, symmetric, bilateral sensorineural hearing loss of cochlear type, normal acoustic reflex thresholds, non-decay and prolongation of acoustic reflex latency.^[14]

Based on our study it can be postulated that patients with RA are at higher risk of hearing impairment.

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