

**HEARING IMPAIRMENT ASSOCIATED WITH RHEUMATOID ARTHRITIS CLINICAL
AND THERAPEUTIC SCIENCES: A REVIEW****Dr. Kiran K. Kannade^{1*} and Dr. Sangeeta S. Salvi²**¹MS Scholar Shalakyatantra Department, Tilak Ayurveda Mahavidyalay, Pune.²MS, Ph.D. (Shalakyatantra), Prof. and HOD Shalakyatantra Department, Vice Principal, Tilak Ayurveda Mahavidyalaya, Pune.***Corresponding Author: Dr. Kiran K. Kannade**

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ABSTRACT

As one of our most important senses, the ability to hear enables us to connect to the world for many vary important, even vital, reasons. As the famed 20th-century activist and educator, Helen Keller, once said, "Blindness cuts us off from things, but deafness cuts us off from people. Rheumatoid arthritis (RA) is a systemic, autoimmune disease that presents with intra-articular and extra-articular manifestations. Auditory system may be involved during the course of Rheumatoid Arthritis disease due to number of pathologies. Hearing Impairment in Rheumatoid arthritis is generally under diagnosed; symptoms are progressive and patients are not aware of the damage until it interferes with their usual activity.^[1,3] Research suggests that individuals with rheumatoid arthritis may be at an increased risk of developing hearing impairments, particularly sensorineural hearing loss. The exact mechanism linking rheumatoid arthritis to hearing loss is not fully understood, but inflammation may play a role. Audiometry is a diagnostic test commonly used to assess hearing abilities. To test hearing in all newly diagnosis as well as regular intervals during the course of disease.

KEYWORDS: Rheumatoid Arthritis, Hearing loss, Hearing impairment associated with rheumatoid arthritis, Pure Tone Audiometry, Sensorineural Hearing loss, Extended high frequency hearing loss.

INTRODUCTION

A person's senses of hearing is incredible versatile. It can detect extremely quiet sounds, determine whether the noise came from far or near, and isolate a specific sound within dense background noise. Rheumatoid arthritis (RA) is a chronic, inflammatory, autoimmune disease that affects 1% of the population.^[1] It primarily associated with articular and periarticular features and non-articular involves other organs including Heart, Lung, Skin, Eye, Ear. Rheumatoid Arthritis can affect the auditory system. Either as direct complication of disease course or secondary to medication adverse effect. Rheumatoid Arthritis induced ear disease presents with Tinnitus, Conductive hearing loss Unilateral or Bilateral Sensorineural hearing loss, sudden onset of Hearing loss and mixed hearing loss. Among all the percentage of sensorineural hearing, sudden onset of hearing loss is more than conductive hearing loss.^[2] Drug induced ototoxicity include salicylates, NSAIDs, HCQ, Disease Modified Anti Rheumatic Drug (DMARD) can affect the auditory system. There is a wide variation in the reported prevalence of different types of hearing loss in RA patients.^[3] Sensorineural hearing loss (SNHL) is the most common type of hearing impairment in RA patients

ranging from 25% to 72%.^[2] Conductive hearing loss (CHL) and mixed hearing loss (MHL) have also been reported less frequently. The frequency of hearing loss and the average hearing threshold in RA patients were higher than healthy individuals. The most common type hearing loss is sensorineural. SNHL at high frequencies is similar to presbycusis and usually occurs bilaterally.

AIM

The aim of this work was to evaluate the pattern of hearing impairment in patients with Rheumatoid Arthritis and to examine the possible associations between Rheumatoid Arthritis and hearing loss.

OBJECTIVE

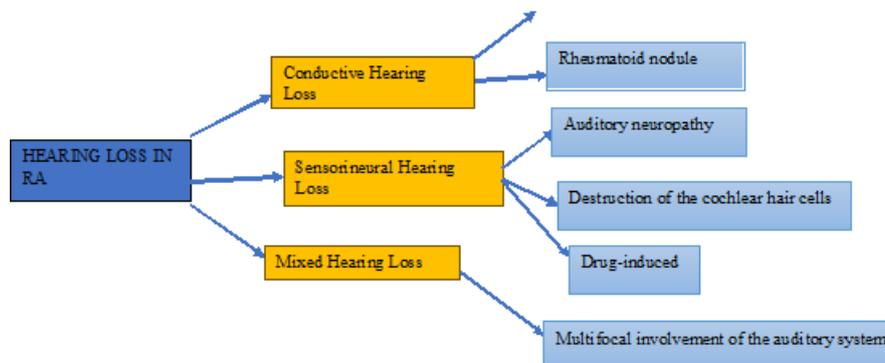
- To study detail about hearing impairment associated with Rheumatoid Arthritis.
- To study the pathology, audiological evaluation, management of Hearing Impairment associated with Rheumatoid Arthritis.

MATERIAL AND METHOD

- Extensive Literary review of various books of such as P. L. Dhingra, P. Hazarika, Scott-Brown's Otorhinolaryngology book
- A thorough literature search was performed using available databases including PubMed, Embase to cover all relative reports.

- It also includes study of various articles and case studies related to Hearing impairment and Rheumatoid Arthritis.

Pathology



1. **Synovial destruction** of Incudostapedial (IS) and Incudomalleolar (IM) joints by an inflammatory process. As Incudomalleolar and Incudostapedial joints are true diarthroses, they may consequently be involved in RA, like any other joints in the body. This may cause no clinical symptoms since these two joints are functionally fixed during sound transmission.^[4] It has been thought that CHL occurs due to discontinuity in middle ear ossicles.^[14,15] However, some authors have suggested that increase in the stiffness of ossicular system may give rise to CHL in RA.^[2,5]

2. **Rheumatoid nodules** are the most prevalent extra-articular manifestation in RA patients that may present in different locations, however commonly found subcutaneously at points of pressure. Various ear nose throat sites including pharynx, larynx and nose as well as the ears may be affected. Treatment with methotrexate and possibly tumour necrosis factor (TNF) inhibitors may cause rheumatoid nodules or aggravate the tendency to development.

3. **Auditory neuropathy** due to a probable vasculitis as a part of mononeuritis multiplex.

4. **Destruction of the cochlear hair cells**, or the inner ear due to immune complex deposition.

5. **Drug-induced ototoxicity:** Certain kind of drugs including salicylates, non-steroidal anti-inflammatory drugs (NSAIDs), antimalarial and some other disease-modifying antirheumatic drugs (DMARDs) can affect the auditory system.

6. Tinnitus, loss of absolute acoustic sensitivity and alterations of perceived sounds are the most frequent side

effects of large doses of salicylates. Symptoms develop shortly after treatment initiation, fluctuating during the treatment, and are generally reversible.

7. Hydroxychloroquine and chloroquine are associated with variable injuries to the cochlear sensory hair cells and a decrease in neuronal population and supporting structures as well as atrophy of stria vascularis resulting in SNHL. This might be reversible if appropriate treatment with corticosteroids in addition to cessation of the drugs is initiated.

Hearing Assessment

Different types of hearing tests are available and described in the previous studies mostly pure tone audiometry and Otoacoustic Emissions to accurately diagnose hearing loss in RA patients.

Pure Tone Audiometry

Pure tone audiometry is the most frequent test to assess hearing loss, and is performed at frequencies varying from low pitches 250 Hz to high pitches 8000 Hz. 250 Hz and 500 Hz are low frequencies; 1000 Hz and 2000 Hz are middle frequencies; and 4000 Hz and 8000 Hz are high frequencies. Extended high frequency audiometry, which tests very high frequencies ranging from 8,000–16,000 Hz, can detect hearing loss at an earlier stage; however, it is not commonly used.^[19,20] Earlier evaluations revealed that RA patients have a higher prevalence of hearing loss for all frequencies including low^[22], middle^[21], high^[23] and very high.^[24]

Tympanogram

Mechanisms include affection of external and/or middle ear by the fixation of rheumatoid ossicular joints or RA-

associated destruction of joints and ligaments of auditory ossicles explaining As or B type tympanogram.^[18]

Transiently Evoked Otoacoustic Emissions

TEOAEs test has been used widely to evaluate cochlear function in paediatric and adult populations, since it is easily detectable and can be modified according to age and gender. In this technique sounds emitted in response to acoustic stimuli of very short duration. These sounds are produced by healthy cochlear systems most probably the outer hair cells, whereas any kind of cochlear dysfunction results in decrease or disappearance of TEOAEs.^[5] Various amounts of decreases have been reported in RA patients. However, some of these patients had normal hearing representing an early stage of hearing impairment.

MANAGEMENT

There is no consensus regarding the management of hearing impairment in patients with rheumatoid arthritis. Based on empirical grounds, treatment with oral steroid plus cessation of ototoxic drugs should be initiated.^[25,9,26,6] Under special circumstances, Intratympanic application of steroids with optimized dosage may result in better response (frequencies over 2000 Hz) (under special circumstances).^[6] One study recommended treatment with vasodilators to improve cochlear circulation, when there is a decrease in emission amplitudes. Anti-oxidants for instance sodium salicylate, vitamin E and N-acetyl cysteine may play a protective role for the inner ear.^[7] Although hearing impairment may present as a subclinical disease, regular audiometric test and TEOAEs is advisable and can diagnose hearing loss at an early stage.^[7,8] When there is a clinical suspicion of serous otitis, radiographic evaluation of affected ear may be beneficial to diagnose RA nodules.^[9] Patients and their families should be aware of the noxious effects of smoking on the inner ear which can deteriorate the condition.^[7] As alcohol consumption may deteriorate hearing impairment, reduction or cessation of alcohol use is beneficial.^[10,11] In the CHL and MHL cases, surgical intervention may be required to repair the sound conduction mechanism of the middle ear.^[12]

CONCLUSION

Based on review it can be postulated that patients with RA are at higher risk of hearing impairment compared to healthy subjects in their course of the disease. In spite of wide diversity regarding published results, it is obvious that hearing impairment in RA is a multifactorial disease, since it can be affected by environmental factors (e.g., smoking), and disease characteristics (e.g., rheumatoid nodule) as well as patients characteristic (e.g., age). On the other hand, these factors may affect each other both directly and indirectly. For instance, aging has a direct effect on the duration of the disease, and exposure to environmental factors (e.g., noise and acoustic trauma, smoking, etc.) will be increased with aging of the patients.^[18] Furthermore, aging is the most frequent cause of age-related hearing loss (Presbycusis). Bilateral

symmetrical sensorineural hearing loss (SNHL) is significantly more frequent in RA patients.

The frequency of hearing loss and the average hearing threshold in RA patients were higher than healthy individuals. The most common type hearing loss is sensorineural.^[27]

DISCUSSION

Although SNHL is frequently emphasized in these patients with RA, both SNHL and less commonly CHL and MTHL seen. There are studies reporting that SNHL developing in RA is more severe in low frequencies^[27] while there are also authors reporting that it is observed at high frequencies.^[28,29] In recent studies; it was concluded that in RA patients with demonstrated transient evoked otoacoustic emissions (TEOAEs) decrease or absent, may be represent an early stage of hearing loss, vasodilator treatment and antioxidant drugs may be useful for protection of the inner ear.^[30,31] However, these conditions should be evaluated in larger studies. It is possible to increase the quality of life by early detection of otologic effects of the disease and planning of rehabilitation with progressing disease.

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