

Rheumatoid Factor and Hearing Loss

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Abstract To find out the association between rheumatoid factor and hearing loss, a prospective study was conducted at Tertiary care/Medical college hospital. We screened 85 patients with positive rheumatoid factor for evidence of hearing loss. These patients were collected from the Departments of Medicine and Orthopedics. Out of 85 patients, who were positive for rheumatoid factor, underwent screening for hearing loss. These patients had a normal pure tone audiogram but Distortion product otoacoustic emission (DPOAE) was absent in twenty three patients. DPOAE was absent in 27% of cases, in whom there was positive rheumatoid factor. It was extremely statistically significant.

Keywords Rheumatoid factor · Distortion product otoacoustic emission · Autoimmune ear disease · Hearing loss

Introduction

Rheumatoid factor is an antibody found in various conditions, such as rheumatoid arthritis, Sjogren's syndrome, mixed essential cryoglobulinemia, primary biliary cirrhosis, and subacute bacterial endocarditis. It is also present in old age in 20% of the cases.

Diagnosing autoimmune disease is difficult and very controversial. It accounts to less than 1% of all the cases of hearing impairment.

Therefore, we need to find a way to diagnose autoimmune ear disease in a simpler and non-controversial way, see Table 1.

Hypothesis

We need to find out the association between rheumatoid factor and hearing loss.

Material and Methods

1. *Inclusion criteria (study group)*: Patients below the age of 40 years with positive rheumatoid factor, no previous history of hearing loss, presently no complaints of hearing impairment, absence of other chronic systemic medical illness, no history of chronic intake of drugs, no ear, nose, and throat abnormalities, and a normal pure tone audiogram.
2. *Exclusion criteria*: Patients above the age of 40 years, with a previous history of hearing loss, complaints of hearing impairment, chronic medical disease, ENT abnormalities, abnormal pure tone audiogram, and a prolonged history of drug intake.
3. *Control group*: Healthy individuals below the age of 40 years, with no history of hearing loss, no complaints of hearing impairment, no medical or surgical illness, no ENT abnormalities, and no history of prolonged drug intake.

Procedure

All patients visiting the Orthopedics and Medicine departments were screened. Patients below the age of 40 years, with positive rheumatoid factor, absence of

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Table 1 2 × 2 contingency table, plotting of DPOAE in patients with rheumatoid factor and healthy individuals

	DPOAE absent	DPOAE present	Total
Study group (patients with positive rheumatoid factor)	23 (27%)	62	85
Control group (healthy individuals)	2	48	50

The results are tabulated and analyzed by 2 × 2 contingency table

chronic medical or surgical illness, and no prolonged history of drug intake were selected. The above patients were included in the study group.

These study group patients underwent a thorough ENT examination to rule out any ear, nose and throat abnormalities. Later, pure tone audiogram was done. Patients with a normal pure tone audiogram were again selected to undergo distortion product otoacoustic emission (DPOAE). The results were tabulated and analyzed.

The control group also underwent the same process.

Result

Out of 85 patients with positive rheumatoid factor and a normal pure tone audiogram, 23 cases (27%) were free from DPOAE. In the control group, only two individuals (4%) were free from DPOAE. DPOAE was absent in 27% of the patients with positive rheumatoid factor, whereas DPOAE was absent in 4% of healthy individuals. The *P* value equals 0.0005. Therefore the association is extremely statistically significant.

Discussion

Rheumatoid factor is an antibody directed against the Fc fragment of the human IgG and was so named because it was first identified in patients with rheumatoid arthritis.

Auto-immune ear disease is a rare disorder, accounting for less than 1% of hearing loss. Most of the hearing losses due to auto-immune nature goes undetected.

There are various theories which explain the cause of auto-immune ear disease. They are

1. *By stander damage* [1]: Damage to the inner ear causes cytokines to be released, which provoke, after a delay, additional immune reaction.
2. *Cross reactions* [2]: Antibodies cause accidental inner damage because the ear shares common antigens with a potentially harmful substance.

3. *Intolerance* [3]: The ear, like the eye may be only a partially “privileged” locus. The body may wrongly mount an attack on the “foreign” antigens when they are released.
4. *Genetic factors*: Genetically controlled aspects of the immune system may increase or be associated with increased susceptibility to common hearing disorder such as Meniere’s disease [4].

Considering these theories, the Rheumatoid factor, which is positive in rheumatoid arthritis, Sjogren’s syndrome, mixed essential cryoglobulinemia, primary biliary cirrhosis, subacute bacterial endocarditis, systemic lupus erythematosus, tuberculosis etc., was taken into account to find out auto-immune ear disease. Anti cochlear antibody (anti-HSP 70) [5] is another test which is under study to diagnose auto-immune ear disease. However, this test is still being done on an experimental basis. As there is no specific test [6] for autoimmune ear disease, a combination of rheumatoid factor and DPOAE will give a satisfactory diagnosis.

In this study of 85 patients with positive rheumatoid factor, 27% were free from DPOAE which was extremely statistically significant. There was no association to titers of rheumatoid factor and hearing loss. Therefore, this procedure of diagnosing auto-immune ear disease affords a simple and effective way to deal with it.

The rarity, difficulty to study, and speculation regarding auto-immune ear disease can be things of the past.

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