Effects of Multiple Sclerosis on Medio-olivocochlear System

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Information

• Multiple Sclerosis (MS) is a chronic inflammatory disease characterized by focal destruction and involvement of myelin in the central nervous system and spinal cord.
• Various symptoms may be seen in MS due to the effect of myelinated nerve fibers depending on the region where demyelination occurs.
• The medio-olivocochlear (MOC) system controls the outer cells of micromechanical properties and is responsible for the frequency selective and high sensitivity of the auditory system through selective acoustic amplification.
• In this study, whether MS affects the MOC system of olivococlear efferent systems was evaluated by transient evoked otoacoustic emission (TEOAE) and contralateral broadband noise suppression test.

Matherials and Methods

• This study was performed with MS group consisting of 30 subjects and control group consisting of 32 subjects.
• Peripheral hearing was evaluated by pure tone audiometry test.
• The MOC system was evaluated by using TEOAE with a contralateral broadband noise suppression test.
• Persons with tympanic membrane’s scarring, acute or chronic otitis, any pathology in the external ear canal, and hearing loss were excluded in our study.

Results

• Otoacoustic emission values of right (R) and left (L) ears were significantly different between MS patients and control group. Otoacoustic emission values were lower in both ears in the MS group than in the control group. (Figure 1)
• As a result of the contralateral suppression test performed to evaluate the MOC reflex, there was a significant difference between the MS and control groups in the right and left ears at 4000 Hz. (Figure 2)
• Inverse correlation was observed between the EDSS values of MS and the effect of the MOC reflex at 4000 Hz. (Table 1)
• MOC reflex decreased between 1000 Hz and 4000 Hz in right and left ears. The correlation was found between this result and duration of MS. MOC reflex was not observed as the duration of the disease increased. (Table 1)

Conclusion

• In MS patients, the MOC reflex of the right and left ear is affected at 4000 Hz and this result indicates that the ability to distinguish speech in noise can be affected in latest stages of the disease.
• In conclusion, in this study considering that otoacoustic emissions reflect cochlear functions, the low emission responses obtained in MS can be attributed to early subclinical involvement of outer hair cells from the auditory pathways.
• The decrease in the suppression value at 4000 Hz in MS patients showed that MOC reflex was affected.
• In addition, as the duration of disease increased, the effects at 4000 Hz increased. These results may be examples of other studies evaluating the auditory pathways of MS.

Figure 1: Comparison of OAE values between MS and control group in right and left ear (* p <0.05).

Figure 2: Comparison of 4000 Hz OAE values of patient and control groups with and without suppression (p <0.05).

Table 1: Correlation between MOC reflex and Expanded Disability Status Scale (EDSS), duration of disease at 1000,4000 Hz.