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Specific training by music therapy in the early rehabilitation of adult CI users

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Abstract

Objective

Adult Cochlea Implant (CI) users often regain good speech comprehension after implantation. Nevertheless, listening to music and the perception of emotional prosody in speech can remain unsatisfactory. Therefore, the German Centre of Music Therapy Research in cooperation with the Department of Otorhinolaryngology at the University Hospital Heidelberg has developed a standardized music therapy concept in order to train the hearing performance by musical stimuli. CI users attend the training in the early rehabilitation after surgery and initial activation of the speech processor.

Results of a preliminary study indicated that the training may improve hearing performance. Specific musical tests especially demonstrate increased timbre recognition. In subjective ratings of CI sound quality, the patients score significantly higher after therapy. Currently, a large-scale representative study (n = 45) is under way. The objective of the study is to examine the effectiveness of music therapy in the domains of psychological, musical and prosodic assessments as well as psychophysiological measures compared to normal hearing persons.

Methods

Music therapy according to the Heidelberg Model is a standardized intervention composed of five modules. Each module incorporates a variety of exercises adapted to the use in early rehabilitation. The exercises might be individually adjusted to meet the differing hearing abilities of the CI users. The training aims at improving speech comprehension and production focusing especially on emotional speech prosody. Furthermore, it addresses musical components to facilitate music perception. In order to evaluate the benefit of the training, specific psychological and musical tests as well as tasks on prosody perception are applied. Psychological testing

covers subjective sound quality and ratings of quality of life. Musical tests comprehend pitch discrimination, melody recognition and timbre identification. Pitch discrimination is measured by 24 fixed tasks and adaptive testing of musical intervals. Recognition of melody, prosody, pitch of voice and sounds are assessed by six specific tasks each. Timbre identification includes eight tasks. Psychophysiological measurements (skin conductance level and - reaction as well as pulse rate) during different hearing conditions complete the evaluation.

Results

Unilaterally implanted, postlingually deafened adult CI users are included in the study. Preliminary results of eight CI users who had achieved both the music therapy and diagnostics before and after the training are presented in comparison to the hearing performance of 25 normal hearing adults conducting the same diagnostic tools. Statistically significant improvements from before to after therapy were found in subjective sound quality, pitch discrimination, timbre identification, recognition of noises and recognition of prosody. Differences in test performance between CI users and normal hearing persons were considerable, especially in timbre identification and recognition of prosody and pitch of voice. The performance after therapy approximated the level of the normal hearing, particularly concerning the recognition of prosody. Preliminary results of biofeedback measurements indicate changes in psychophysiological arousal during hearing tasks.

Conclusions

These results suppose that music therapy can be effective in the early rehabilitation of adult CI users. The improvement of hearing performance may not only concern music listening, but also components of speech like prosody and pitch of voice recognition or the identification of sounds of daily life. The influence of music therapy on psychophysiological arousal during hearing tasks will be further examined. A waiting control group of CI users who do not receive music therapy is currently investigated and assessed.

Keywords

Music Therapy, Adult CI users, Music Perception