

# The Effectiveness of Microcurrent Stimulation Combined with Sound Therapy for Tinnitus Relief: A Preliminary Study

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## Abstract

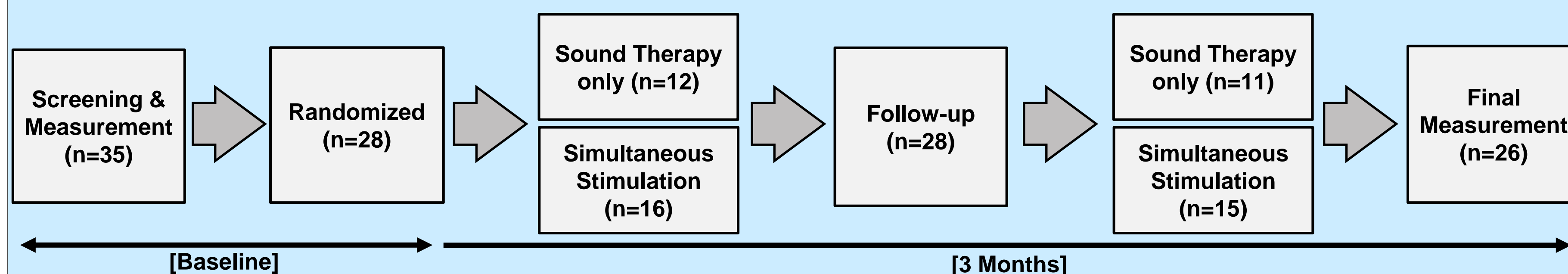
- Various stimulation-based rehabilitation approaches have been proposed for the alleviation of tinnitus.
- Twenty-six participants with chronic sensorineural tinnitus were randomly assigned to one of two groups based on the rehabilitation approaches (sound therapy-only group and combined microcurrent and sound therapy group).
- The effectiveness of the rehabilitation approaches was determined based on changes in the Korean version of the tinnitus primary function questionnaire (K-TPFQ) and visual analog scale for loudness (VAS-L) scores at baseline, 1.5 months, and 3 months.
- For the K-TPFQ scores, both groups exhibited a large effect of rehabilitation; however, for the VAS-L scores, the simultaneous stimulation group demonstrated a large effect of rehabilitation, whereas the sound therapy group exhibited a small effect. Therefore, a rehabilitation approach that combines sound stimulation with microcurrent stimulation can improve response and perception in tinnitus.

## Objectifs

- This study aimed to determine the efficacy of a rehabilitation approach that simultaneously provides microcurrent and sound stimulation for relief from tinnitus and prove that the microcurrent and sound stimulation is more effective compared to the sound stimulation alone.

## Méthodes et Matériels

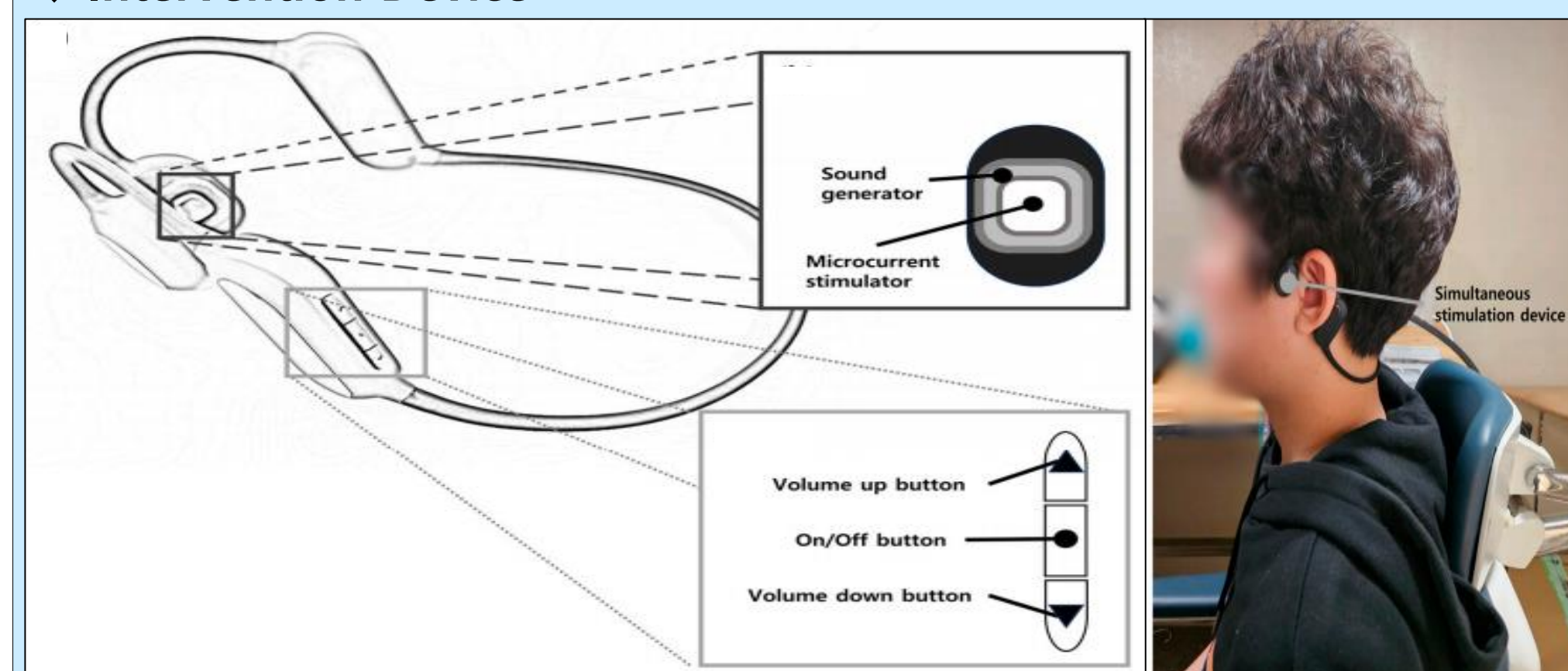
### Research Protocol



[Figure 1] Flowchart of the number of participants for each study phase.

- Thirty-five participants were recruited for the study. And each participant underwent sound therapy or simultaneous stimulation for approximately 2 h daily for 3 months.

### Intervention Device



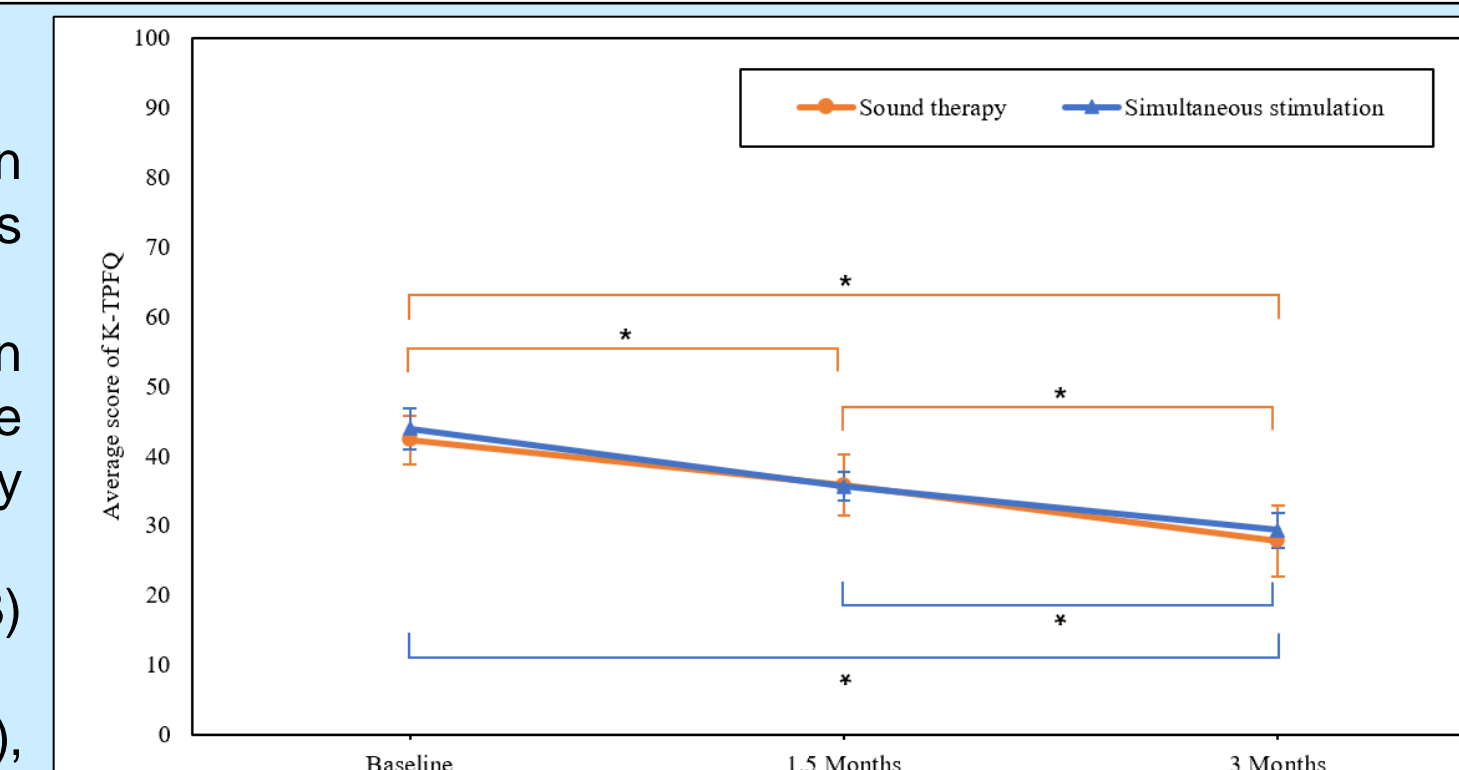
[Figure 2] A schematic of the simultaneous stimulation device, stimulator, control button, and a photo of wearing the simultaneous stimulation device.

- The simultaneous stimulation device consisted of two microcurrent stimulators, two sound generators, and control buttons (Figure 2).
- Microcurrents were delivered simultaneously with a sound therapy stimulus through a microcurrent stimulator in two positions, left and right.
- The researchers set the stimulation level to provide microcurrent stimulation one level below the level at which each participant began to perceive microcurrents.
- The K-TPFQ is a tinnitus questionnaire that measures secondary difficulties (such as emotions, hearing, concentration, and sleep) caused by tinnitus on a scale of 0 to 100, with higher scores indicating greater difficulties caused by tinnitus.
- The VAS-L requires participants to rate the magnitude of their perceived tinnitus on a scale of 0 to 100, with higher scores indicating greater perceived tinnitus.

## Result

### Group Analysis

- The results of this study showed that while sound therapy alone resulted in significant improvements in tinnitus reaction only, simultaneous stimulation has the potential to significantly improve both tinnitus reaction and perception.
- Analysis based on mean values by group revealed significant improvements in the K-TPFQ and VAS-L scores in both groups; however, effect size comparisons revealed differences between the groups. When analyzed by group effect size, both groups exhibited a large effect on the K-TPFQ.
- The mean K-TPFQ effect size was large for both the sound therapy ( $d = 0.93$ ) and simultaneous stimulation ( $d = 0.86$ ) groups.
- The mean VAS-L scores sound therapy group exhibited a small effect size ( $d = 0.45$ ), whereas the simultaneous stimulation group exhibited a large effect size ( $d = 0.95$ ).

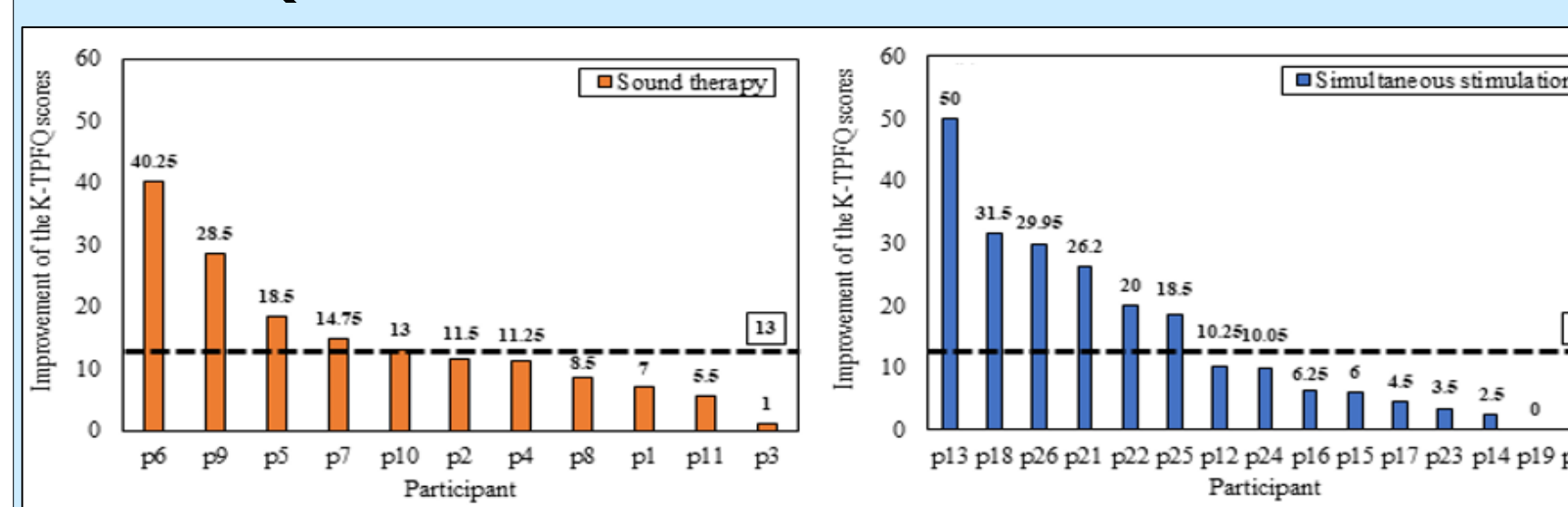


[Figure 3] Mean scores and standard errors of the K-TPFQ for the two groups at baseline, 1.5 months, and 3 months.

\* Asterisks indicate statistical significance

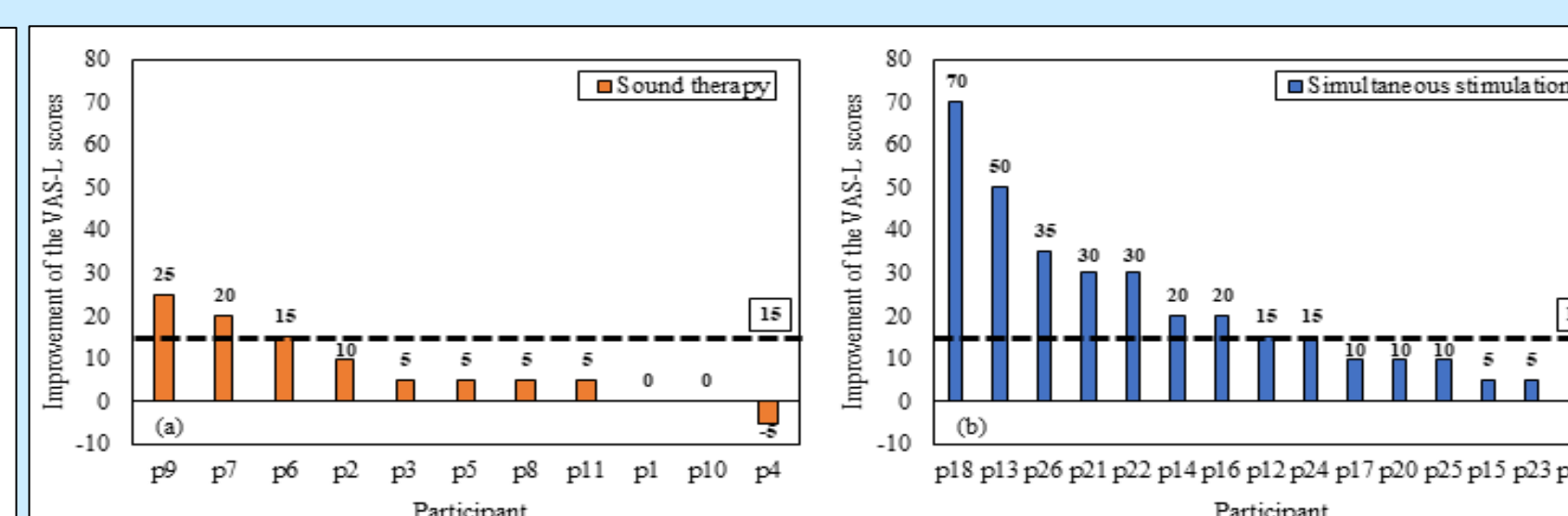
### Individual Analysis

#### K-TPFQ



[Figure 4] Improvements in the individual K-TPFQ score changes between baseline and 3 months. The dotted black lines indicate the MCID value. MCID, minimum clinically important difference.

#### VAS-L



[Figure 5] Improvements in the individual VAS-L score changes between baseline and 3 months. The dotted black lines indicate the MCID value.

- The extent of individual tinnitus improvement was analyzed based on the minimal clinically important difference (MCID) values of the K-TPFQ (13 points) and VAS-L scores (15 points).
- K-TPFQ scores, 5 of 11 (45.45%) patients in the sound therapy group exhibited an improvement of  $\geq 13$  points, and 6 of 15 (40.00%) patients in the simultaneous stimulation group exhibited an improvement of  $\geq 13$  points.
- VAS-L scores, 3 of 11 (27.27%) patients in the sound therapy group had an improvement of  $\geq 15$  points, whereas 9 of 15 (60.00%) patients in the simultaneous stimulation group exhibited an improvement of  $\geq 15$  points.

## Conclusion

- Simultaneous stimulation therapy, which combines sound and microcurrent stimulation is a rehabilitation approach which has the potential to improve both the reaction and perception of tinnitus by suppressing tinnitus and make an effective option for patients.

## Références

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