



Intensive Notched Music for Tinnitus Treatment: A Randomized Controlled Trial



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Abstract

Introduction: According to the AAO-HNS recent clinical practice guideline for tinnitus, published in 2014, sound therapy is still optional treatment for persistent or bothersome tinnitus. This study aimed to evaluate the effectiveness of short and intense tailor-made notched music therapy combined with education and counseling on reducing tinnitus, in order to provide the support evidence for further application of sound therapy as standard treatment.

Methods: A single-blinded prospective randomized controlled trial was conducted on 32 participants with chronic subjective tinnitus from September 2021 to November 2022 at the outpatient clinic, Department of Otolaryngology, Chiang Mai University Hospital. Subjects were allocated into two groups: (1) treatment group, which listened to tailor-made notched music for 6 hours a day for 7 consecutive days combined with education and counseling, and (2) control group, which received education and counseling alone. Outcome measures were the Tinnitus Handicap Inventory (THI) Thai Version Questionnaire and visual analogue scales, which measured perceived tinnitus loudness, annoyance, noticeable time, and effects of tinnitus on daily life. Participants rated their tinnitus before and 7, 14, and 28 days after treatment initiation.

Results: There was a significant reduction of the total THI score, emotional aspect of the THI score, and visual analogue scale (loudness) in the treatment group compared to the control group after 7 days of treatment initiation (p-values = 0.008, 0.008, and 0.038, respectively).

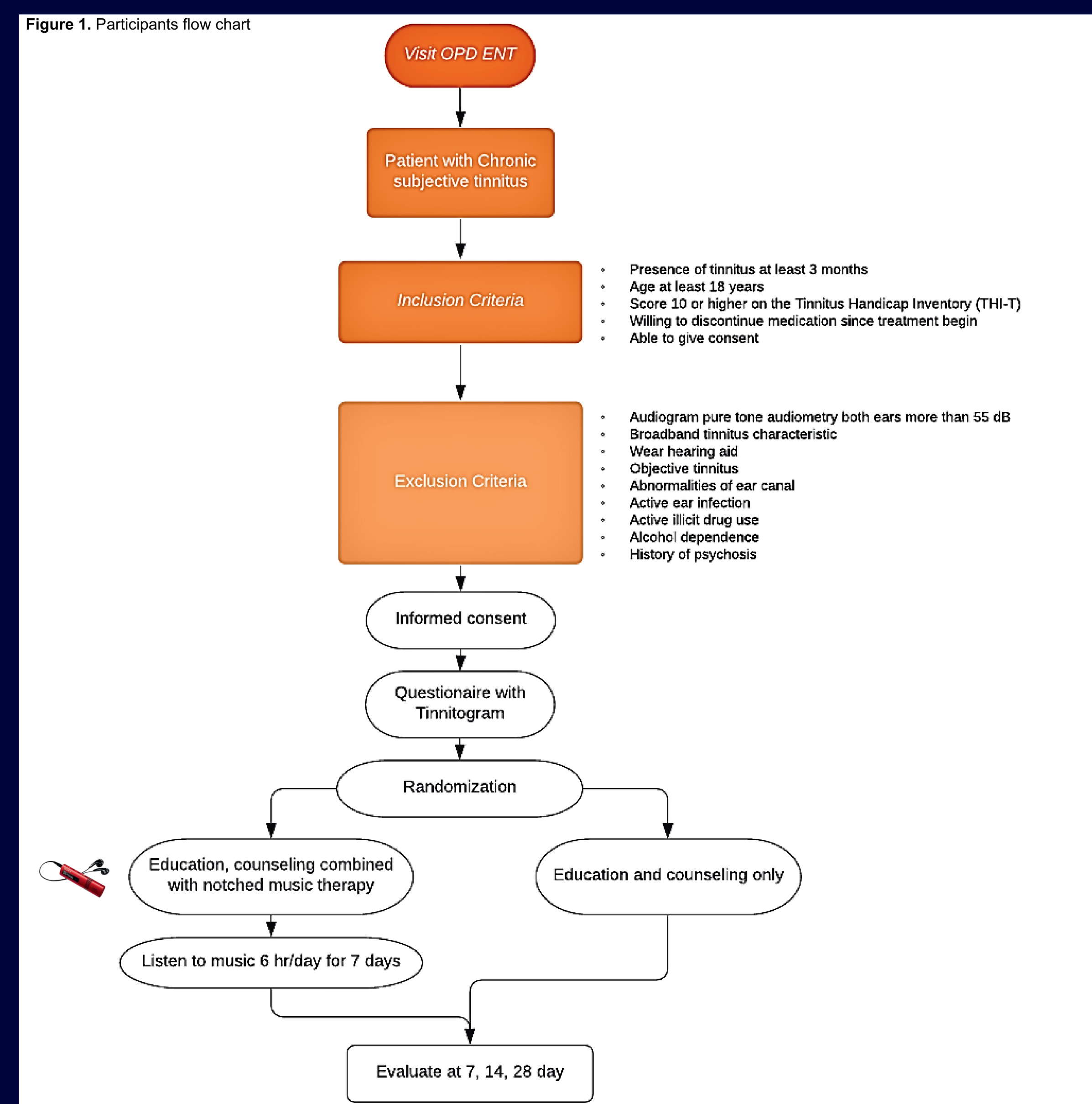
Conclusions: The short and intense tailor-made notched music therapy combined with education and counseling significantly reduced the total THI score, emotional aspect of the THI score, and visual analogue scale (loudness) compared to education and counseling alone.

Background

In patients with tinnitus, auditory cortex activity was shown to be enhanced in relation to tinnitus frequency.(1) Notched music, which removed one octave of frequency centered on the tinnitus frequency, was thought to reduce tinnitus perception by decreasing cortical activity and inducing neural plasticity.(2, 3)

Okamoto et al.(2) firstly introduced the use of tailor-made notched music in chronic tinnitus patients significantly reduced subjective tinnitus loudness and tinnitus related auditory cortex activity, but with a limited number of patients (n = 8) and a long treatment time (12 months). According to Teismann et al.(4), short and intense tailor-made notched music training (TMNMT) had an effect in patients with tinnitus frequencies <8 kHz by reducing subjective tinnitus loudness, tinnitus-related distress, and tinnitus-related auditory cortex evoked activity. But there was no control group included in this study; therefore, we designed the study to evaluate the effect of this treatment plus standard treatment versus standard treatment alone to precisely measure the efficacy of the treatment.

Methods



Outcome measurements

- Thai version of the Tinnitus Handicap Inventory (THI-T).(5)
 - 100 points (25 items): functional (12 items), emotional (8 items), catastrophic (5 items)
- The Visual analogue scale (VAS)
 - 4 categories: loudness, annoyance, noticeable time, effects of tinnitus on daily life

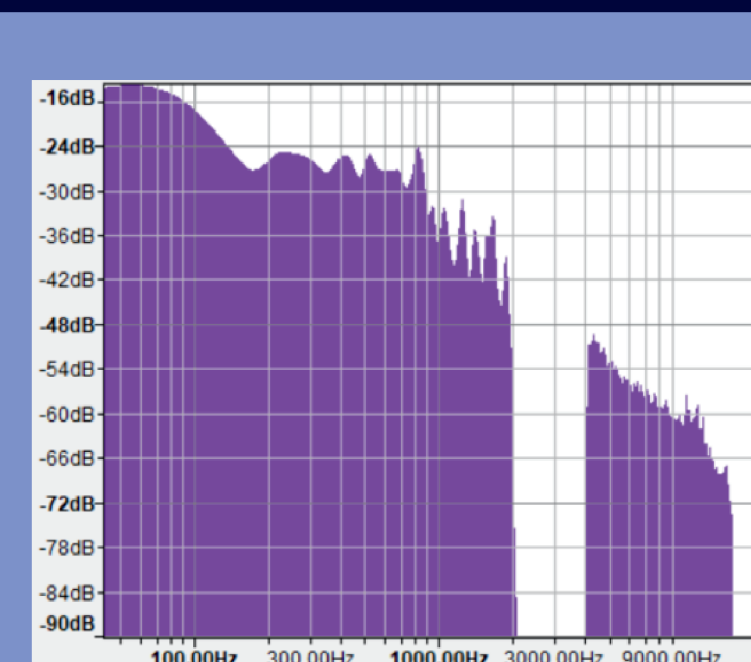
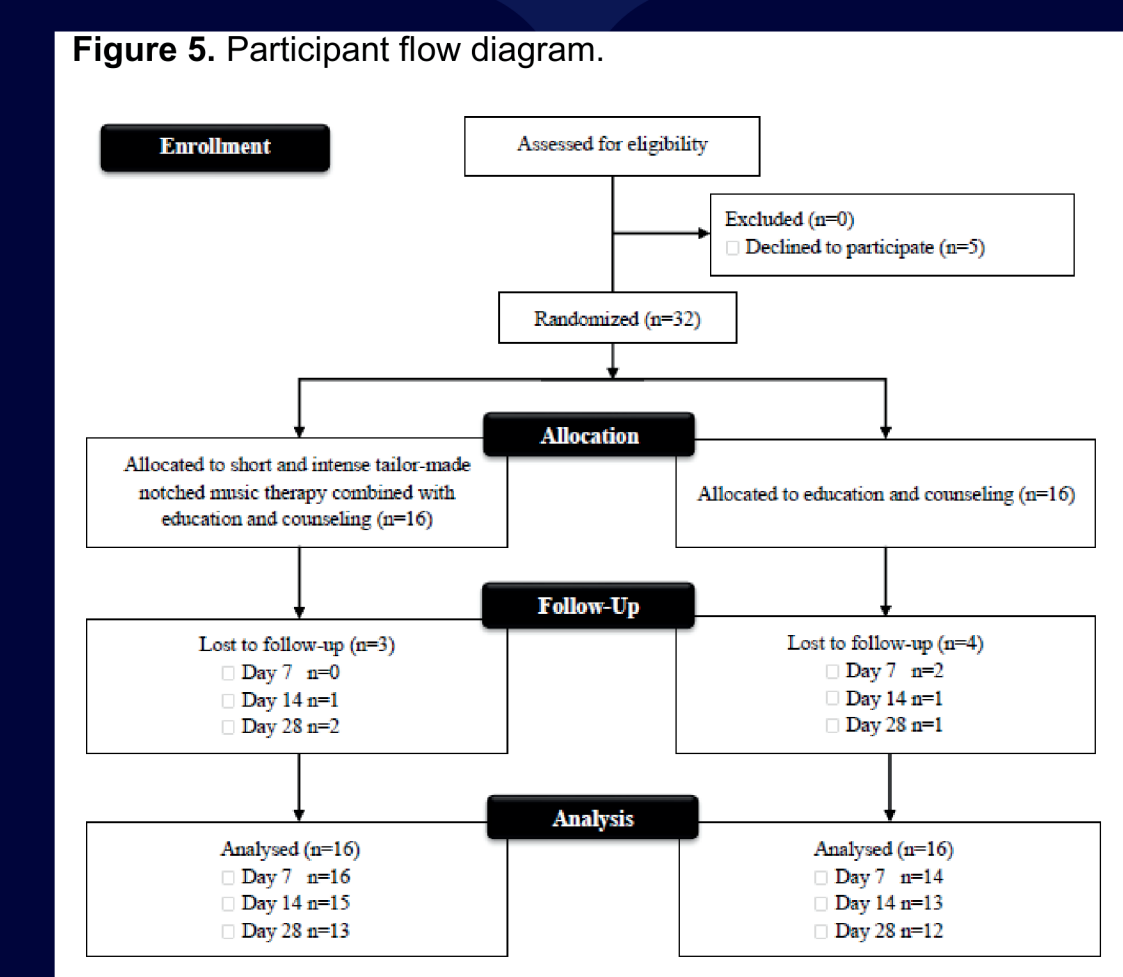
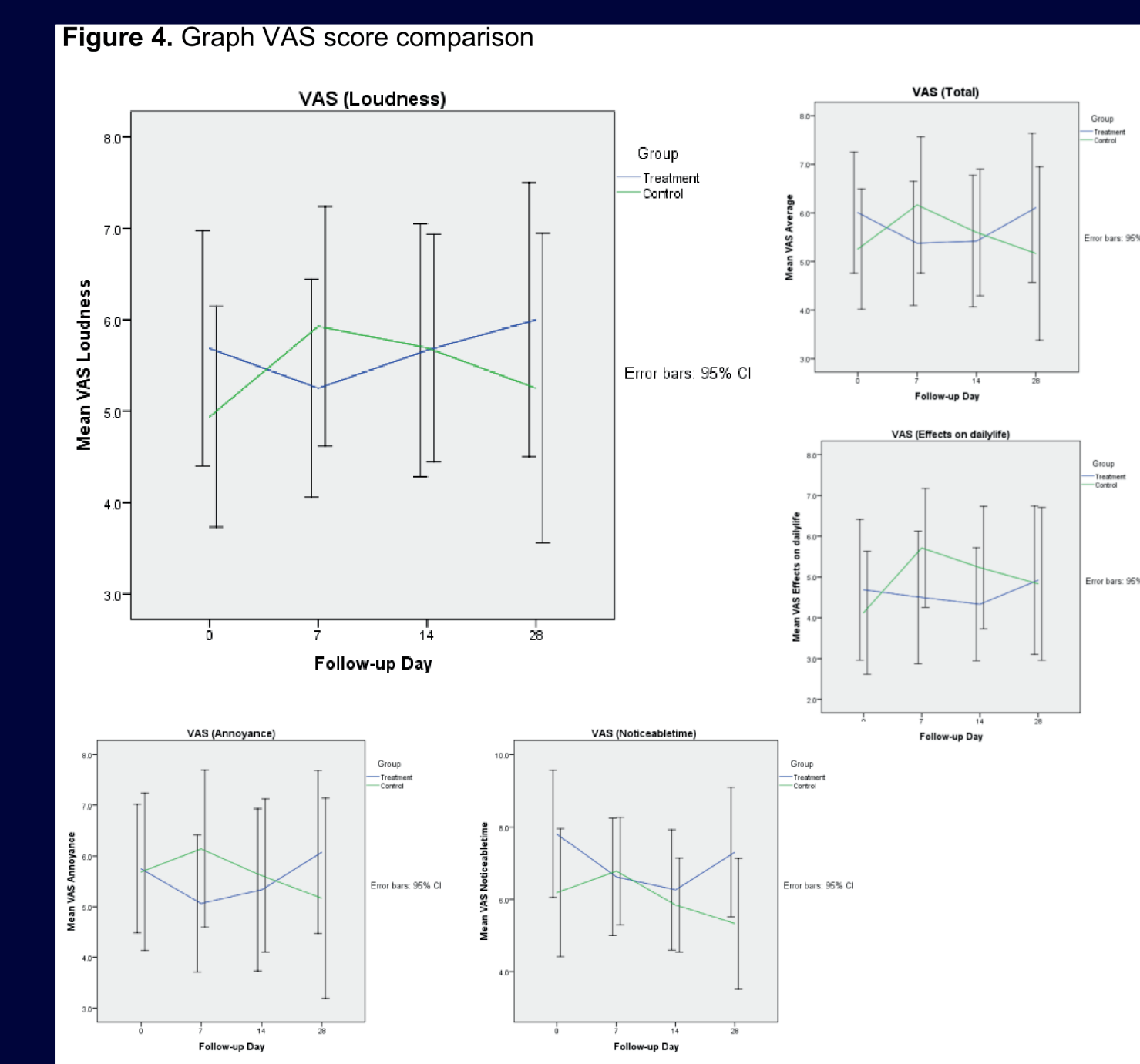
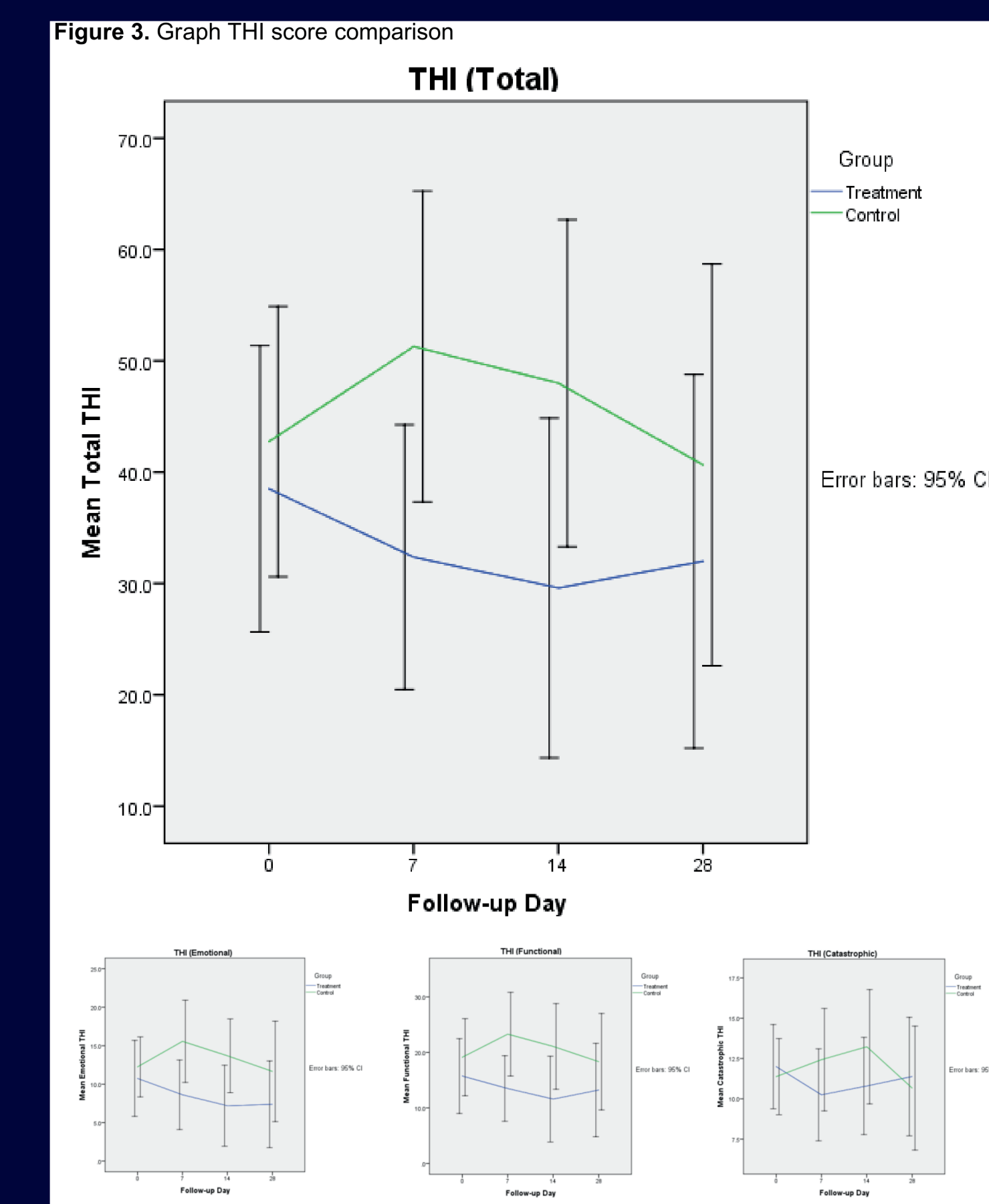


Figure 2. An example wave plot of a patient with a 3000 Hz tinnitus frequency applied from 2121 to 4242 Hz.

Intervention

- Education and counseling
 - Verbal explanation with a Thai leaflet
- Customized sound therapy
 - Remove the frequency band of 1-octave width (lower frequency- f divided by square root 2, upper frequency- f multiplied by square root 2) centered at the individual tinnitus frequency from 6 hours of music chosen by the physician downloaded into a portable music player

Results



There was a significant reduction of the total THI score, emotional aspect of the THI score, and visual analogue scale (loudness) in the treatment group compared to the control group after 7 days of treatment initiation (p-values = 0.008, 0.008, and 0.038, respectively), as shown on Table 1. Similarly, both THI and VAS scores and their subscales tend to decrease in the treatment group while increasing in the control group, as shown in Figure 3,4.

Table 1. Difference of Score Comparison

	Treatment	Control	Difference ^a	p-value ^b
Difference from Baseline to 1 week (N = 30)				
Total THI	-6.13 ± 13.98	8.29 ± 13.51	14.41	.008 ^c
Functional aspect of THI	-2.25 ± 8.91	4.29 ± 9.38	6.54	.061
Emotional aspect of THI	-2.13 ± 4.03	3.29 ± 6.16	5.41	.008 ^c
Catastrophic aspect of THI	-1.75 ± 4.19	0.71 ± 2.89	2.46	.075
Total VAS	-0.63 ± 2.05	0.89 ± 2.04	1.52	.051
VAS (Loudness)	-0.44 ± 1.63	0.86 ± 1.61	1.29	.038 ^c
VAS (Annoyance)	-0.69 ± 2.36	0.50 ± 2.14	1.19	.162
VAS (Noticeable time)	-1.19 ± 3.47	0.43 ± 3.59	1.62	.229
VAS (Effect on daily life)	-0.19 ± 3.49	1.79 ± 2.42	1.97	.087

Conclusion

The short and intense tailor-made notched music therapy combined with education and counseling significantly reduced the total THI score, emotional aspect of the THI score, and visual analogue scale (loudness) compared to education and counseling alone.

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