



Reduced Pain Perception and Analgesic Medication Consumption After Acoustic Binaural Beats Application in Patients Suffering From Chronic Pain – A Randomized Control Trial

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Introduction -Objectives

Pain is one of the most unpleasant yet common symptoms presenting in patient care, bearing a heavy impact on quality of life, patient disability and socioeconomic costs¹. In Europe, 40% of chronic pain patients report inadequate treatment for their pain².

Binaural Beats (BB) consist of two artificial acoustic stimuli, with a small difference between them in wave frequency, presented simultaneously but separately to each ear³. The human brain perceives, and synchronizes to, the difference between the two frequencies (entrainment)⁴.

The aim of this study was to test the hypothesis that brain entrainment in a lower function rhythm, with the application of BB, can decrease pain perception and subsequently analgesic medication use, in patients suffering from chronic pain.

Methods

Twenty-one patients with chronic pain from the outpatient Pain Unit of AHEPA Hospital, Thessaloniki, Greece, participated in this two-phase double blind, randomized, cross-over trial. Chronic pain was defined as pain that persists past normal healing time, i.e. pain that lasts or recurs for longer than 3 months.

Binaural beats with a 5Hz difference in frequency (theta rhythm), with soft music in the background, compared to placebo (soft music, without a difference in frequency) were applied for 30 minutes on site and then on patient demand for a week, while keeping a pain severity and analgesic medication consumption diary. Pain (numeric scale, NRS), stress (STAI) and medication usage (defined daily doses, DDD) were assessed at baseline, after 30 minutes and at the end of the week. All participants underwent a 2 part examination, with one week wash out interval, in a cross-over design.

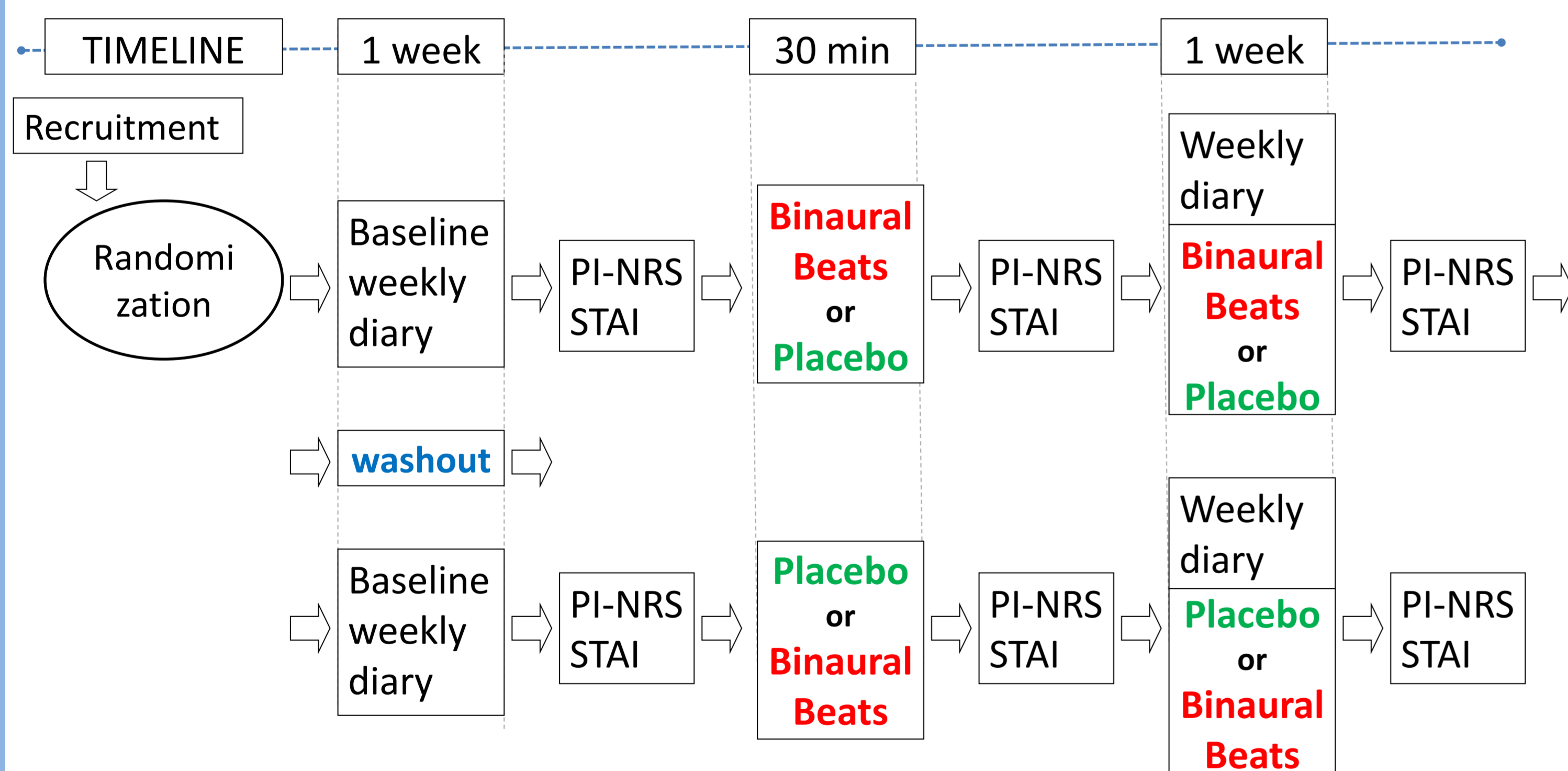


Figure 1. The study protocol
PI-NRS: Pain Intensity Numeric Rating Scale
STAI: State-Trait Anxiety Inventory

Results and Conclusions

Twenty-one chronic pain patients from AHEPA Hospital outpatient Pain Unit participated in the study. The participants were 58.76±14.63 years old, 48% male, with mean pain syndrome duration 8.12±10.2 years.

Perceived pain (NRS) was significantly reduced in the BB group (from 5.6±2.3 to 3.4±2.6, p<0.001), compared to the placebo group (from 5.2±2.1 to 4.8±2.3, p=0.78), during the first 30 minute phase, as well as at the end of the week (to 3.9±2.5 compared to 5.5±2.6 respectively, p<0.001) (Table 1 and Figure 2).

Table 1. Changes in pain and stress after 30 minute and 1 week binaural beats application

	Binaural Beats					Placebo				
	Baseline	30 min	p	1 week	p	Baseline	30 min	p	1 week	p
PI-NRS	5.6±2.3	3.4±2.6	<0.001	3.9±2.5	<0.001	5.2±2.1	4.8±2.3	0.79	5.5±2.6	0.83
STAI	46.8±13.3	37.6±9.4	<0.001	5.9±1.8	<0.05	43.8±13.3	37.9±10.1	<0.05	6.3±1.7	0.87

PI-NRS: Pain Intensity Numeric Rating Scale, STAI: State-Trait Anxiety Inventory
p: compared to baseline

Analgesic medication consumption (DDD, g) during the week was significantly less in the BB group (3.9±3.7 vs 4.6±4.1, p=0.02), while reporting equal mean levels of perceived pain (5.9±1.8 vs 6.3±1.7, p=0.22) (Figure 2).

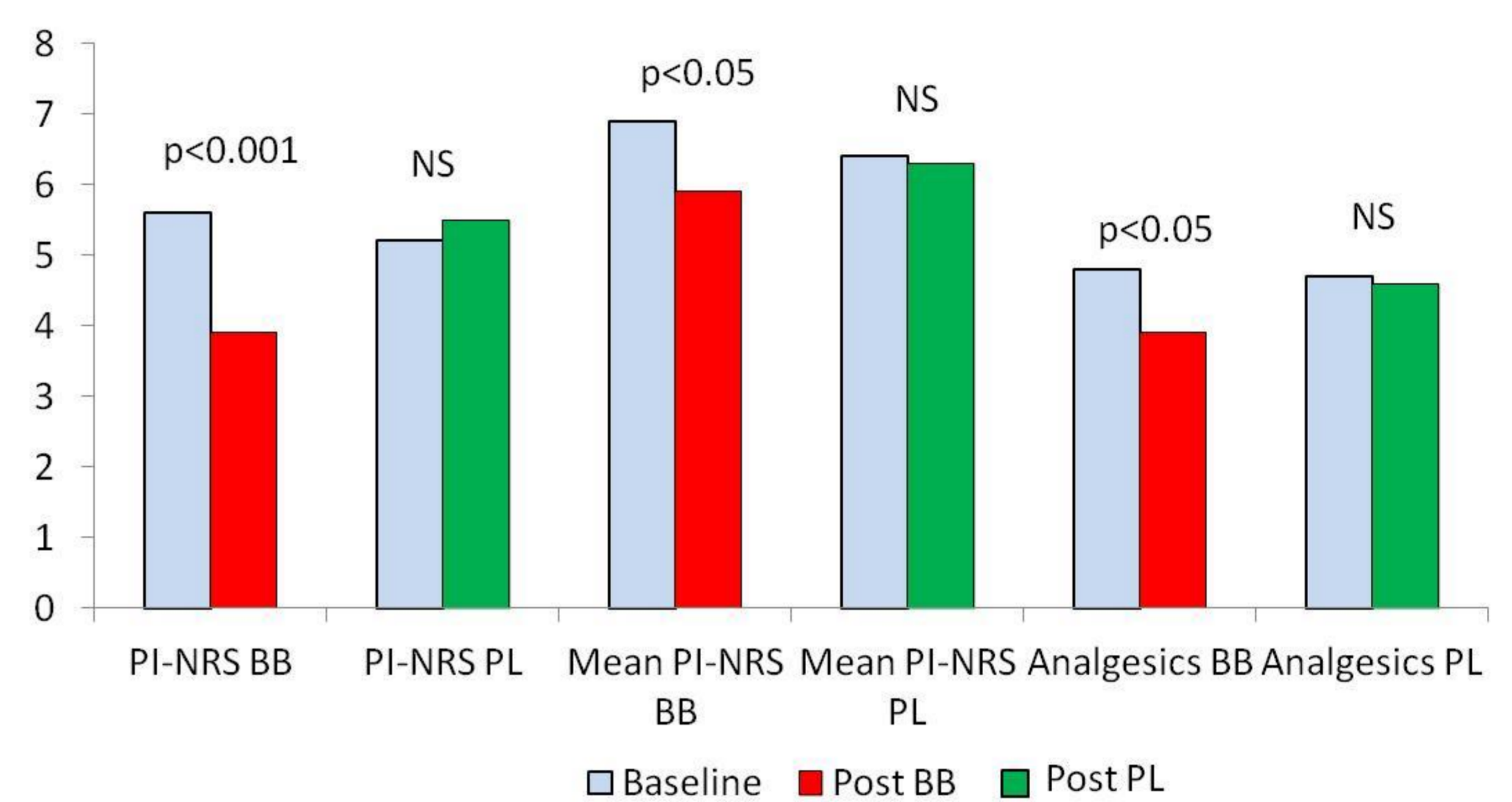


Figure 2. Perceived pain and analgesic drugs consumption at baseline and after one week intervention

PI-NRS: Pain Intensity Numeric Rating Scale, Mean PI-NRS: Mean daily perceived pain during the intervention week, BB: Binaural beats, PL: Placebo

Stress was equally and significantly reduced in the two groups at the end of 30 minutes, but remained reduced only in the BB group at the end of the week (Table 1 and Figure 3).

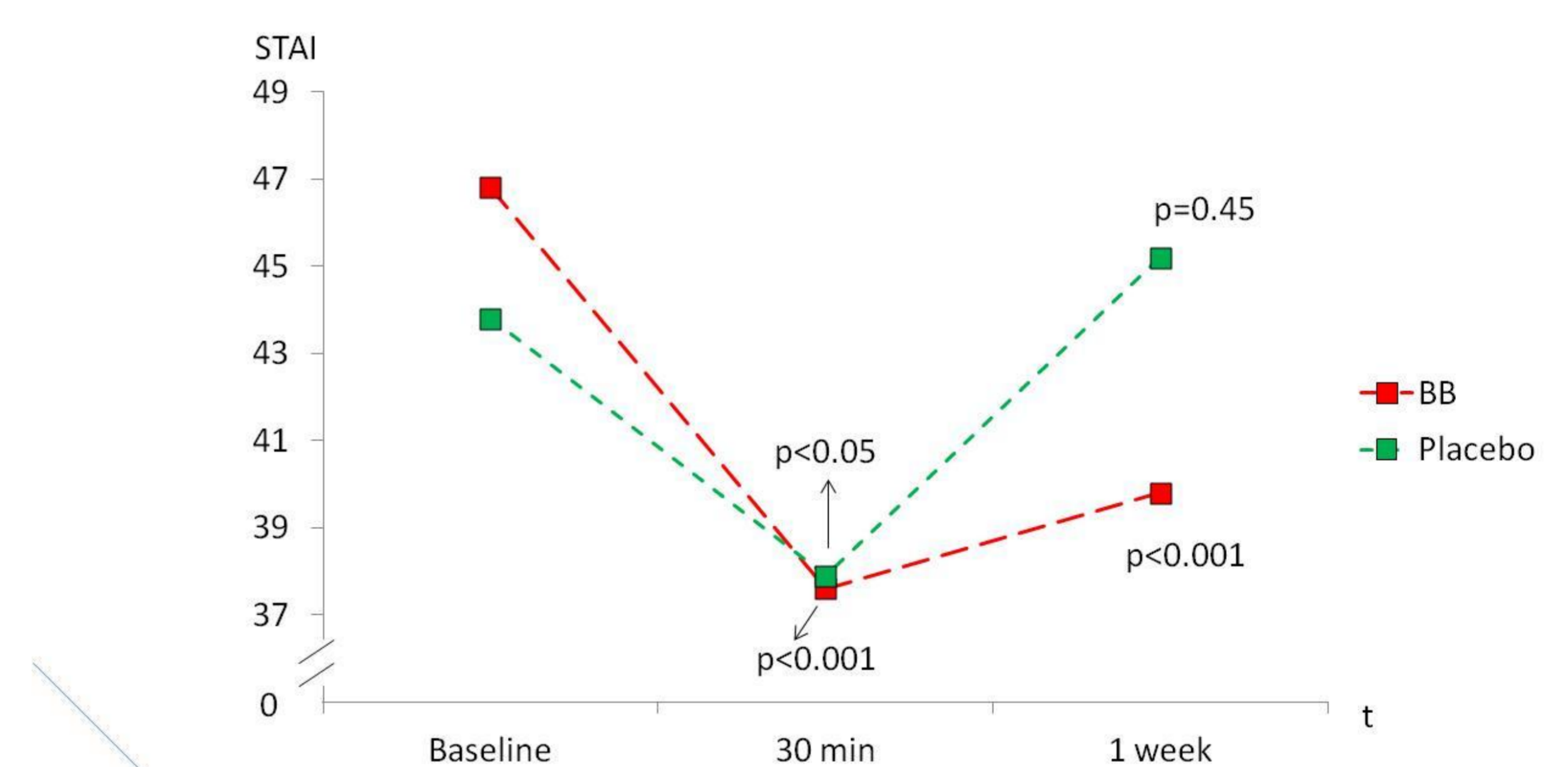


Figure 3. Reported stress values at baseline, 30 minutes and end of week
BB: Binaural beats
p: compared to baseline

In our study, theta rhythm acoustic binaural beat application reduced perceived pain severity, reported stress and everyday analgesic medication use, compared to placebo, in patients suffering from chronic pain.

Binaural beats could be a simple, safe and low-cost tool that can alleviate pain intensity and provide valuable support to established pain therapies.

References

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