

Non-pharmacological Intervention for Chronic Pain in Veterans: A Pilot Study of Heart Rate Variability Biofeedback

Melanie E. Berry, MS; Iva T. Chapple, MD; Jay P. Ginsberg, PhD; Kurt J. Gleichauf, PhD; Jeff A. Meyer, PhD; Madan L. Nagpal, PhD

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Affiliations: Wm. Jennings Bryan Dorn VA Medical Center, Columbia, South Carolina, United States.
Wm. Jennings Bryan Dorn VA Medical Center, Columbia, South Carolina, United States.
Wm. Jennings Bryan Dorn VA Medical Center, Columbia, South Carolina, United States.
Wm. Jennings Bryan Dorn VA Medical Center, Columbia, South Carolina, United States.
Wm. Jennings Bryan Dorn VA Medical Center, Columbia, South Carolina, United States.
Wm. Jennings Bryan Dorn VA Medical Center, Columbia, South Carolina, United States.

Correspondence: Jay.Ginsberg@va.gov

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ABSTRACT

Objective: Chronic pain is an emotionally and physically debilitating form of pain that activates the body's stress response and over time can result in lowered heart rate variability (HRV) power, which is associated with reduced resiliency and lower self-regulatory capacity. This pilot project was intended to determine the effectiveness of HRV coherence biofeedback (HRVCB) as a pain and stress management intervention for veterans with chronic pain and to estimate the effect sizes. It was hypothesized that HRVCB will increase parasympathetic activity resulting in higher HRV coherence measured as power and decrease self-reported pain symptoms in chronic pain patients.

Study design: Fourteen veterans receiving treatment for chronic pain were enrolled in the pre-post intervention study. They were randomly assigned, with 8 subjects enrolled in the treatment group and 6 in the control group. The treatment group received biofeedback intervention plus standard care, and the other group received standard care only. The treatment group received four HRVCB training sessions as the intervention.

Measures: Pre-post measurements of HRV amplitude, HRV power spectrum variables, cardiac coherence, and self-ratings of perceived pain, stress, negative emotions, and physical activity limitation were made for both treatment and control groups.

Results: The mean pain severity for all subjects at baseline, using the self-scored Brief Pain Inventory (BPI), was 26.71 (SD=4.46; range=21–35) indicating a moderate to severe perceived pain level across the study subjects. There was no significant difference between the treatment and control groups at baseline on any of the measures. Post-HRVCB, the treatment group was significantly higher on coherence ($P=.01$) and lower ($P=.02$) on pain ratings than the control group. The treatment group showed marked and statistically significant (1-tailed) increases over the baseline in coherence ratio (191%, $P=.04$) and marked, significant (1-tailed) reduction in pain ratings (36%, $P<.001$), stress perception (16%, $P=.02$), negative emotions (49%, $P<.001$), and physical activity limitation (42%, $P<.001$). Significant between-group effects on all measures were found when pre-training values were used as covariates.

Conclusions: HRVCB intervention was effective in increasing HRV coherence measured as power in the upper range of the LF band and reduced perceived pain, stress, negative emotions, and physical activity limitation in veterans suffering from chronic pain. HRVCB shows promise as an effective non-pharmacological intervention to support standard treatments for chronic pain.

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