Psychological Pain Treatment in Fibromyalgia: Systolic Extinction Training (SET) and Cardiovascular Training restores Baroreflex Sensitivity, reduces Pain Sensitivity and Clinical Pain Report

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Introduction

Important components of intrinsic pain regulatory systems are modulated by cardiovascular dynamics that influence baroreceptor sensitivity (BRS). The present study evaluated the effects of extinction training combined with electrical stimulation administered during either the systolic or diastolic phase of the cardiac cycle ("systolic extinction training", SET) in patients with fibromyalgia syndrome (FMS). SET was compared to cardiovascular training (CVT) combined with the same electrical stimulation.

Methods

35 FMS patients with an elevated blood pressure response to laboratory stressors were randomly assigned to either SET (n = 20), or CVT (n = 15). Clinical pain, sensory, pain and tolerance thresholds, psychophysiological measures and EEG components (N50, N150, P260, P390) were assessed pre- and post-treatment.

Therapeutic Design

Patients in each group received 10 sessions over five weeks (2/week). Each session combined electrical stimulation (see Fig1) with:

- SET 50 min of psychological Extinction Training (perception training, increasing physical activity and self-assertiveness)
- CVT 30 min of mild cardiovascular workout on a bicycle ergometer, instructed by a trained physiotherapist.

Results 1 – Clinical Pain & Thresholds

Only SET but not CVT showed a significant effect on clinical pain intensity, whereas all thresholds significantly increased in both groups (all Ps < 0.01).

Results 2 – Baroreflex Sensitivity

Both SET and CVT patients show a significant increase in BRS (PRSA) after training (all Ps < 0.05).

Results 3 – EEG Components

SET as well as CVT patients show changes in cortical pain processing after training as indicated by changes in early and late EEG components (N50, N150, P260, P390), with greater effects for SET.

Conclusions

These data suggest that cardiac gating of peripheral afferent stimulation may result in long lasting pain remission if it is combined with an effective behavioral treatment but not if combined with physical training only. We conclude that SET activates both sensory and cognitive-affective brain regions involved in pain inhibition while CVT seems to activate sensory brain regions only, and therefore – in contrast to SET – fails to re-establish functionality of intrinsic pain inhibition mechanisms.