**Emotional modulation of pain is disrupted in persons with insomnia**

Jennifer L. DeL sweetheart, MA, Ellen L. Terry, MA, Emily J. Bartley, MS, Kara L. Kerr, BA, & Jamie L. Rhudy, PhD

Department of Psychology, The University of Tulsa, 800 South Tucker Drive, Tulsa, OK 74104

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**Introduction**

Sleep and pain exhibit an interactive relationship. Research has shown that individuals deprived of sleep experience hyperalgesia (heightened sensitivity) to thermal and pressure pain, and impaired sleep commonly co-occurs with chronic pain conditions (secondary insomnia). Primary insomnia is characterized by chronic (>1 month) impaired sleep without an identified pathophysiology. Using procedures referred to as diffuse noxious inhibitory controls (DNIC, i.e., using pain to inhibit pain), previous studies have shown that insomnia patients exhibit an impaired ability to modulate pain.

**Objective**

Given that emotion modulates pain, such that negative emotions enhance pain and positive emotions inhibit it, the present study examined whether emotional modulation of pain is disrupted in insomnia patients relative to healthy controls.

**Participants**

- Insomnia patients (n=12) obtained a score of ≥ 10 on the Insomnia Severity Index (ISI, measure of sleep impairment), reported symptoms according to ICD-10 for insomnia, and reported no other major psychopathology.
- Healthy controls (n=12) reported no sleep impairment and no chronic pain or major psychopathology.
- Groups did not differ significantly in age or gender distribution.

**Procedure**

- Informed consent obtained
- Electrode applied to the ankle over the sural nerve, EMG sensors applied to the biceps femoris muscle
- Level of stimulation intensity set at 120% nociceptive threshold
- Participants watched a series of emotionally-charged pictures while randomly receiving electric stimulations to the ankle

**Methods: Pain Assessment**

- To elicit pain, electric stimulations were sent to the sural nerve of the ankle while participants viewed the pictures
- For each stimulation, participants rated how painful it felt on a scale from 0-100

- A significant Group (Insomnia vs healthy control) X Picture Content interaction was found (p=.034)

  - Healthy controls showed the expected emotional modulation pattern of modulation by emotion—greater pain ratings during mutilation pictures and lower pain ratings during erotica
  - Insomnia participants did not modulate pain by emotion

**Conclusions & Implications**

- The present study supports previous findings of disrupted pain modulation in insomnia
- The present study adds to previous research, suggesting that emotion may not influence pain in persons with insomnia
- Given the interactive relationship between sleep, pain and emotion, assessment of sleep in chronic pain populations is recommended

**Directions for Future Research**

- Use emotional modulation paradigm to:
  1. Determine mechanisms underlying disrupted emotional modulation of pain in insomnia
  2. Assess emotional modulation of pain in depressed patients with and without insomnia
  3. Assess emotional modulation of pain in persons with other sleep disorders

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