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Effects Of Light Induced Analgesia On Anxiety For Fibromyalgia Patients

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Introduction Psychological comorbidities are often present in chronic pain conditions like fibromyalgia; anxiety is reported in up to 85% of fibromyalgia patients. Anxiety, especially fear-based anxiety, has been linked to higher opioid use. Pain shares similar biological mechanisms with anxiety. Anxiety is an important mediator in the cognitive constructs of catastrophizing, hypervigilance, and fear avoidance that exacerbates pain experiences. Anxiety has been implicated in the development of persistent pain states. The preclinical studies using green wavelengths of light offer potential for the clinical use of green light for patients with pain and anxiety. We studied patients with chronic pain exposed to blue, clear, and green light therapy and the effects of anxiety. **Methods** Patients with fibromyalgia, on opioids were consented and randomized to one of three groups: blue, clear or green. Patients were recruited from August 2019 to December 2020 and instructed to wear their study glasses for a minimum of 4 hours per day for the 2 weeks they are in enrolled in the study. Patients completed the PROMIS-57 profile, which consists of 7 domains including anxiety, at baseline, and 2 weeks after intervention. A total of 45 patients were randomized, 15 per group. Once completed, an additional 4 patients were recruited into the clear glasses group due to a significant lower completion rate in this group. This was mainly due to adverse events experienced, most of which were headaches. **Results** A total of 49 patients were recruited and randomized, and 34 patients completed the study: 10 blue, 12 clear and 12 green. The observed change in anxiety scores found the only group with a decline was the green group (medians of -3, 3.5, and 2 in the green, blue, and clear groups, respectively ($p = 0.11$)), and a significant difference on the fear question in particular ($p = 0.03$). After performing a linear regression analysis for change in anxiety domain score, the decline in anxiety score for the green group was estimated to be 4.2 points greater than that for the clear group (95% CI [-9.8, 1.4]; $p = 0.138$), figure 3. The trending difference in anxiety scores between green and clear groups remains when we further adjusted for age or compliance. There was no evidence of a difference between the anxiety domain scores for the blue group compared to the clear group (mean difference [95% CI] 1.5 [-4.3, 7.4]; $p = 0.601$). **Conclusion** Pain shares similar biological mechanisms with anxiety. Anxiety is an important mediator in the cognitive constructs of catastrophizing, hypervigilance and fear avoidance in the exacerbation of pain experiences. Anxiety has been implicated in the development of persistent pain states. Opioids are implicated in acute modulation of anxiety and anxiety-related brain response. In addition to pain relief, opioid benefits may relate to off-target effects such as anxiety. Many patients taking opioids for chronic pain are reluctant to decrease their regimen due to the fear of severe pain, and this fear-based anxiety can lead to the escalation of opioid use. In the chronic pain population, this anxiety may be elated by the opioid these patients take for their pain syndrome. In order to successfully decrease or eliminate opioid use in these patients, their anxiety must also be addressed. Our results demonstrated decreased anxiety in patients receiving green light therapy, most notably in the fear based anxiety. The decline in anxiety score for the green group was estimated to be 4.2 points greater than that for the clear group (95% CI [-9.8, 1.4]; $p = 0.138$). This further supports the use of green light in decreasing anxiety, particularly fear-based anxiety, which may contribute to a decrease in opioid use.

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