Neuropeptide Y And Fear Avoidance Beliefs Are Associated With Self-Reported Disability In Acute Low Back Pain Patients

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Introduction: Axial low back pain is a common condition for which patients seek medical attention. Despite the frequency of this complaint, diagnostic tools to identify patients who are likely to respond to different treatments are lacking. The purpose of the study was to explore the association between serum biomarkers and changes in self-reported pain and disability in patients who are treated with spinal manipulation or standard medical care for axial low back pain.

Methods: Ninety adults 18 years or older were recruited from a single academic center who experienced a new episode of low back pain within the 3 months prior to enrollment. Eligible subjects had an Oswestry Disability Index score between 20-70 points (0-100 scale) and a numeric pain rating score between 3-8 points (0-10 scale). Patients were excluded if they had: 1) prior history of lumbar spine surgery, unstable spondylolisthesis, spinal stenosis, or scoliosis > 20°; 2) signs or symptoms suggestive of nerve root tension and/or neurological deficit in the lower extremity; 3) red flag findings (including history of metastatic cancer, osteoporosis, long-term corticosteroid use, unexplained weight loss of >10% of body weight, spinal pain associated with fever, and severe night pain unrelieved by medication); 4) were receiving any physical therapy, chiropractic therapy, or any other manual therapy for this episode of LBP (within the past 3 months) or any on-going medical care for this episode of LBP; or 5) had a current use of opiate or other prescription medications for LBP, or were pregnant. Individuals were randomized into one of two different types of spinal manipulation [manual-thrust or mechanical-assisted] or standard medical care. Blood was drawn immediately prior to the onset of treatment and at 2 and 4 weeks after treatment. Serum samples were assayed using a commercially available EIA kit for Neuropeptide Y (NPY) at each time-point. Clinical data were also collected on age, BMI, gender, race, metabolic syndrome, general health, tobacco use, fear avoidance beliefs, NSAID use, treatment expectancy, and intermittent vs constant nature of symptoms. Primary clinical outcomes were pain (measured by von Korff pain scale), and disability (measured by Oswestry Disability Index, ODI). Linear regression was performed to identify important baseline predictors (demographic, clinical, and biomarkers) of both change and %change in pain score and disability score.

Results: The overall linear regression model explained 22% of the variability in change in pain score, and 26% of the variability in the change in disability score as measured by the ODI. Baseline fear avoidance scores demonstrated a statistically significant correlation with change in pain score, explaining 4.19% of the variability (p=0.037). Fear avoidance also explained 4.64% of the variability in change in ODI (p=0.012), and baseline NPY demonstrated a trend toward significant correlation with change in ODI, explaining 4.28% of the variability (p=0.057). In examining percent change in outcomes, to account for differences in patients' baseline characteristics, baseline NPY levels demonstrated statistically significant correlations with percent change in ODI score (partial R^2=0.035).
**Discussion:** Discussion: Our data demonstrate important associations of fear avoidance behaviors and response to treatment, which showed correlations with circulating NPY levels. Interestingly, both fear avoidance beliefs and NPY levels were found to be correlated with change in disability. Future studies will be needed to determine if there is a mechanistic relationship between the fear avoidance behaviors and levels of circulating NPY, and if this represents an important target for intervention in this patient population.

**Significance:** Significance: Identifying both patient reported and objective measures of patient outcomes represents an exciting new avenue for designing individualized treatment plans.

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