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An Anti-Inflammatory Diet Compliments Physical Therapy Care of Chronic Low Back Pain: A Case Study

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Abstract

Background: Chronic low back pain continues to be an enigma for clinicians and strain on the US health care system resulting in loss of function and negative psychosocial complications. Long term management requires multidisciplinary care and may include dietary modifications.

Case Presentation: A 35-year-old male (weight: 127.9 kg; body mass index: 36.2 kg/m2) presented with a ten-year history of CLBP and additional comorbidities. He had poor results from prior treatment, which failed to address lifestyle, so an anti-inflammatory diet was added to his care.

Outcome and follow-up: At 8 weeks, his weight and body mass index decreased to 110.2 kg and 31.2 kg/m2, respectively. His functional measures improved, and he reported feeling energized and healthy.

Discussion: Anti-inflammatory strategies in combination with Physical Therapy management of CLBP resulted in considerable weight loss and functional improvement. When patients present with significant body mass and poor diet, addressing these lifestyle factors may be an important tool in the management of CLBP.

Keywords: Inflammation; Nutrition; Obesity; Anti-inflammatory diet; Chronic low back pain

Background

Chronic low back pain (CLBP) is characterized by persistent or fluctuating pain lasting longer than 3 months [15]. It annually impacts 10-30% of US adults and has a prevalence of 65-80% [19]. While there are various underlying pathologies attributed to CLBP, many are associated with an elevated inflammatory state potentially due to structural damage [4,10]. Evidence indicates that disc degeneration associated with CLBP produces higher levels of circulating inflammatory cytokines [10]. Comorbidities, such as obesity and type II diabetes, increase the risk of CLBP and are associated with a systemic, low-grade inflammatory state [11,17-18]. A higher concentration of circulating inflammatory biomarkers may exacerbate CLBP via the modulation of central and peripheral pain by decreasing neural excitation thresholds, potentially leading to CLBP with no identifiable structural cause.

Treatment for CLBP consists of non-pharmacological options (exercise, education, physical activity, spinal manipulation) and if necessary, pharmacological (non-steroidal anti-inflammatory drugs, muscle relaxants) [15]. Exercise exerts anti-inflammatory effects, and evidence suggests it provides pain relief for patients with CLBP [7,15]. Yet patients with CLBP are less active compared to the rest of the population. Therefore, emphasizing the need for non-pharmacological, anti-inflammatory treatments to facilitate exercise may improve care [6].

Adjusting dietary habits has shown some promise in exerting anti-inflammatory effects. Dietary flavonoids have been shown to decrease inflammatory biomarkers such as c-reactive protein (CRP), a sensitive marker of low-grade systemic inflammation. In addition, extracts such as turmeric and ginger reduce inflammation-related joint pain with a better safety profile than non-steroidal anti-inflammatory drugs [5,12].

Dietary modifications to reduce inflammation have been shown to decrease pain in patients with knee osteoarthritis and improve function in patients with rheumatoid arthritis [8,16,21]. Limited evidence exists for the potential of anti-inflammatory dietary modifications to improve symptoms associated with CLBP.

An anti-inflammatory diet which has recently been considered as an integrative strategy for the prevention of severe outcomes from conditions such as COVID-19, served as the foundation for our dietary intervention [2,20]. This case report provides an example of the effectiveness of adding anti-inflammatory dietary strategies to physical therapy for CLBP.

Case Presentation

Approval from a University IRB committee was granted prior to conducting this case study and the patient was informed and consented. The patient, a 35-year-old Caucasian male with a ten-year history of CLBP that included intermittent aching in the right leg, was referred to physical therapy. He reported an inability to consistently manage his symptoms with movement and was inactive due to pain. This physical inactivity resulted in additional pain and weight gain resulting in a body mass index (BMI) of 36.2 kg/m2, or class II obesity.

Past medical history included a herniated nucleus pulposus, intermittent back pain for ten years, lack of regular physical activity, and a need for extended time to complete daily tasks. Upon initial examination, his pain with trunk flexion, which radiated into his right leg, was 7/10 at worst.

Treatment

In conjunction with care consistent with evidenced based treatment, he received a consultation focused on dietary strategies to address the inflammatory characteristic of CLBP and weight gain. Current dietary habits were based on convenience and included foods typical of the standard American diet. The patient had not received specific nutritional information or recommendations during any previous medical consultations.

The initial consultation discussed the anti-inflammatory dietary approach and its implementation into daily life, cooking and shopping. The dietary information was summarized in a packet that included a food pyramid, top sources of anti-inflammatory foods (e.g., vegetables, fruits, whole grains), grocery shopping list ideas (e.g., apples, fresh ginger, olives, spinach, grass-fed meats, dark chocolate, avocado oil), and example menus (TABLE 1) [20].

The follow-up sessions included discussions on current eating habits and questions such as "have you made any adjustments to your diet?" and "what barriers are you facing that is preventing you from changing your diet?"

TABLE 1. Example menu.

Breakfast	Green tea (1 cup); multivitamin; yogurt with fruit (1 serving)
Lunch	Quinoa (1 serving); broccoli and cauliflower (2 servings); black beans (1 serving); ½ avocado; strawberries (1 serving)
Dinner	Brown rice (2 servings); wild Alaskan salmon (1 serving) with added spices and cooked in olive oil; spinach salad (3 servings) with carrots, peas, onions, broccoli, and olive oil
Snack	Apple (2 servings); soy nuts (2 servings); unsweetened dried fruit (1 serving); herbal tea (1 cup)

During this dietary shift, PT care included three visits a week for four weeks then two visits per week for four weeks. Treatment sessions consisted of manual therapy, neuromuscular re-education, advice to perform more physical activity, flexibility activities and therapeutic exercise based on impairments using a treatment-based classification [1].

Assessments included measurements of height and weight to determine BMI, completion of the Oswestry Low Back Pain Disability Questionnaire, Global Rating of Change (GROC) Scale, and a simple pain (0–10) scale. Scores were interpreted according to published guidance on the minimal important change of 30% from baseline to be considered a clinically significant improvement [14]. The Rapid Eating Assessment for Patients (REAP) [9] was administered to determine if patient's diet had changed during the 8-weeks following the initial consultation.

Outcome and Follow-up

During the eight-weeks, the patient's body weight decreased from 127.9 kg to 110.2 kg – a loss of 17.7 kg. The weight loss experienced by the patient resulted in a shift from class II to class I obese according to BMI. The patient also experienced an improvement in functional ability according to both the Oswestry (35% improvement, which is clinically significant) and GROC (score of 5 at 8-weeks) assessments [14] (Table 2).

TABLE 2. Outcome assessments.

Outcome Variable	Initial Evaluation	4-Weeks	8-Weeks
BMI (kg/m^2)	36.2	-	31.2
Oswestry	20	18	13
GROC	-	4	5
Pain (0 – 10)	7	6	6

BMI: Body mass index; GROC: Global rating of change

Dietary information collected at four and eight-weeks from the REAP indicated that the patient consumed more whole grains and low-fat salad dressings, and less of the following: red meat, processed snacks, regular salad dressings, sweet foods (including ice cream), and processed foods. Specifically, the patient started taking a multivitamin, and was consuming salads 3–4 times per week, additional fiber, more fish, and less beef, pork, and refined sugars. Barriers that the patient faced included COVID-19 restrictions, family pizza nights, and convenience.

Discussion

The inclusion of a dietary consultation focused on anti-inflammatory strategies in combination with standard care for CLBP resulted in 13.8% body weight loss and an improvement in functional ability. Anti-inflammatory dietary strategies may lessen the inflammatory burden and facilitate function in patients with CLBP. Anti-inflammatory strategies are important to consider since overweight and obese individuals who participate in less physical activity are more likely to experience low back pain and have higher levels of circulating inflammatory biomarkers [7,13]. Physical activity participation has been shown to exert anti-inflammatory effects, yet patients with CLBP are generally less active compared to the rest of the population, even though as little as 4 weeks of physical therapy exercise for CLBP has been shown to improve functional ability [3].

Given the high likelihood of sedentary behavior with CLBP, our findings from this case suggest that anti-inflammatory dietary strategies may be an effective adjunct to care. In addition to improving functional ability, the patient experienced considerable weight loss (17.7 kg), lower BMI, and a change in category from class II to class I obese. Weight loss occurring over a short period of time (six weeks) has been shown to result in decreased concentrations of circulating inflammatory biomarkers such as CRP [22]. Although it is not possible to determine if the weight loss occurred due to the dietary modifications, it is logical to speculate that it may have had an influence. The combination of increased functional ability and weight loss may contribute to a more efficient recovery in addition to longer term health benefits for the patient. However, we acknowledge the need for long term lifestyle modifications to prevent regaining weight, which is a concern after initial weight loss.

Learning Points

Typical standard of care procedures for CLBP do not include dietary consultation. This simple approach, when implemented to intentionally lessen inflammatory activity, has the potential to lessen the inflammatory burden due to physical inactivity, and facilitate the ability to be more active, improve function and provide long-term health benefits.

It is important to further expand on this work to determine the effectiveness in several patients with CLBP. The timing and extent to which the dietary approach could be implemented as well as measurements of circulating inflammatory biomarkers (e.g., CRP) should also be examined. Nevertheless, the combination of reducing inflammation and weight loss, in addition to improving functional ability, may be a useful strategy to facilitate management of CLBP and improve long term health.

The inclusion of dietary education which focused on anti-inflammatory strategies in combination with physical therapy care for CLBP resulted in considerable weight loss and improved functional ability in this case after eight weeks. Our patient was very motivated and reported consistent following of his diet, exercise, and physical activity. This motivation may not be shared with other patients with CLBP, and strategies that allow for consistency may be required. We suggest this may be a successful strategy for patients with CLBP who present with factors consistent with a poor diet which may impair their ability to exercise as an intervention.

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