

# Multimodal Physiotherapy Based on a Biobehavioral Approach as a Treatment for Chronic Tension-Type Headache: A Case Report

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## Abstract

**Introduction:** Tension-type headache (TTH) is the most common primary headache affecting the general population, which is characterized by bilateral headache and mild to moderate pain. This disorder causes high levels of disability and recent scientific evidence suggests that manual therapy (MT) and therapeutic exercise are effective in reducing medication intake and decreasing the frequency and intensity of headaches in patients with TTH.

**Case Presentation:** A 34-year-old woman was known to have chronic TTH. Initially, the patient presented moderate headaches 5 days per week, mechanical neck pain and no positive response to analgesics. A battery of self-reports was given to the patient to assess disability (using the Spanish versions of the Headache Impact Test-6 and the neck disability index), pain (visual analogue scale) and psychosocial issues (Spanish version of the pain catastrophizing scale) involved in the headaches. All measurements were taken four times during 161 days. Eleven sessions of treatment including MT, motor control therapeutic exercise (MCTE) and therapeutic patient education (TPE) were applied.

**Conclusions:** This biobehavioral-based multimodal physical rehabilitation treatment combining MT, TPE and MCTE produced a substantial reduction in pain intensity, pain catastrophizing, disability and the impact of headaches on patient's life.

**Keywords:** Tension-Type Headache, Musculoskeletal Manipulations, Patient Education, Exercise

## 1. Introduction

Tension-type headache (TTH) is the most common primary headache affecting the general population (1), which is characterized by bilateral headache and mild to moderate pain (2, 3). This disorder causes high levels of disability (1). According to the international classification of headache disorders, TTH is classified into two different categories depending on headache frequency: episodic (< 12 headache days per month) and chronic (≥ 15 headache days per month) (3). The first choice of treatment for patients with chronic tension-type headache (CTTH) is pharmacotherapy (4). The problem is that many patients with CTTH overuse medication, which may increase the frequency and intensity of headaches (5). It is also important to consider that the medication has more effectiveness with episodic TTH than CTTH (6). There is a current need for new non-pharmacological alternatives to treat these patients.

Recent scientific evidence suggests that manual therapy (MT) and therapeutic exercise are effective in reducing medication intake and decreasing the frequency and

intensity of headaches in patients with TTH (7, 8). These treatments are increasingly included in clinical practice, but we believe that physical rehabilitation should integrate a biobehavioral approach to treating patients with CTTH. Importantly, it has been observed that psychosocial factors such as depressive symptoms, dysfunctional coping, and fear-avoidance beliefs could be involved in the chronicity of headaches (9).

The biobehavioral approach for the treatment of chronic craniofacial pain recognizes the importance of psychosocial factors that interact with physiological disturbances in determining pain experience for patients, such as past history of pain, ongoing emotional states, health beliefs and coping skills (10). The biobehavioral approach has five key components that can be used by physiotherapists as education, skills acquisition, skills consolidation, generalization and maintenance (11). This study described physical rehabilitation evaluation and management based on a biobehavioral approach of a patient with CTTH.

## 2. Case Presentation

### 2.1. Patient's Information

The patient examined was a 34-year-old female (60 kg, 1.60 m) with neck pain and a pressing headache, which continued for 5 days a week with moderate intensity for the last year. She had been treated by a neurologist some years ago with methocarbamol plus acetylsalicylic acid and non-steroidal anti-inflammatory drugs (NSAID) with no improvement. Moreover, she tried massage therapy with a little improvement in the short term, but not in the medium and long term.

The first-day interview and clinical exploration showed bilateral location, pressing, deep burning sensation and more than fifteen days of headaches a month for the last 12 months. Symptoms were not aggravated by physical activity and accompanied by photophobia. The patient was known to have CTTH by a neurologist according to the international classification of headache disorders (3).

### 2.2. Clinical Findings

The subjective examination showed that the patient had a forward head posture and pain during cervical extension and lateral bending. In addition, the ranges of cervical motion were measured with the cervical range of movement device (CROM); however, were within normal values. In a manual physical examination, stiffness and limited cervical accessory mobility were observed and manual palpation revealed presence of myofascial trigger points in the neck muscles (sternocleidomastoid, upper fibers of the trapezius, suboccipital muscles and spinal muscles). A battery of self-reports was given to the patient to assess disability, pain and psychosocial issues involved in headaches:

- Pain intensity was measured using visual analogue scale (VAS). The VAS consists of a 100-mm line, on which the left side represents "no pain" and the right side represents "the worst pain imaginable" (12).

- The Spanish version of the Headache Impact Test-6 (HIT-6) (13, 14) consists of a six-item questionnaire that measures the severity and impact of headache on patient's life. The results of HIT-6 are stratified into four grade-based classes including little or no impact (HIT-6 score: 36 - 49), moderate impact (HIT-6 score: 50 - 55), substantial impact (HIT-6 score: 56 - 59) and severe impact (HIT-6 score: 60 - 78) (13).

- The Spanish version of the pain catastrophizing scale (PCS) assesses the degree of pain catastrophizing (15). The PCS has 13 items and a 3-factor structure of rumination, magnification and helplessness.

- The Spanish version of the neck disability index (NDI) measures perceived neck disability (16).

The neck flexor muscle endurance test (NFMET) was used to assess neck flexor endurance isometrically and against gravity (17). The result of this test is based on the amount of time (seconds) that the craniocervical flexion

position can be maintained. This test showed moderate reliability (ICC = 0.67) with a time endurance of 24.1 ± 12.8 seconds for neck pain (17). Moreover, the patient was asked to carry a headache diary on her mobile calendar, to which she had to add an entry for the days with headaches, so we could know the frequency of headaches between assessments. All measurements were performed 4 times; at baseline (T0), 28 days (T1), 72 days (T2) and 161 days (T3). The results of this test and self-report measures are described in Table 1.

**Table 1.** Baseline and Follow-up Measurements From T1 to T4

Measure	Outcome			
	T1	T2	T3	T4
<b>Day</b>	1	28	72	161
<b>Interventions received</b>	0	7	3	1
<b>HIT-6 (36 to 78)</b>	65	48	49	47
<b>VAS (0 to 100)</b>	80	60	10	2
<b>NDI (0 to 50)</b>	14	8	5	4
<b>PSC (0 to 52)</b>	32	24	20	7
<b>NFME (seconds)</b>	3	12	35	32

Abbreviations: HIT-6, Headache impact test; NDI, Neck disability index; NFME, neck flexor muscle endurance test; PSC, Pain catastrophizing scale; T1, Baseline; VAS, Visual analogue scale.

### 2.3. Therapeutic Intervention

The patient received a multimodal physical rehabilitation treatment based on a biobehavioral approach, which consisted of MT, motor control therapeutic exercise (MCTE) and therapeutic patient education (TPE). The patient received 11 treatment sessions during 72 days. Treatment scheme is presented in Table 2. The first two weeks of treatment were conducted 2 sessions per week, followed by weekly sessions until T2 of 45 minutes for each session. In the third week, the patient could not come due to a business trip.

The MT was a combination of articular mobilizations of C0 to C6 levels and manual trigger point treatment. The goal of these techniques was to give mobility to the cervical vertebrae and to relax the neck muscles. Some of the techniques used were side-glide, posterior-anterior mobilizations and soft-tissue mobilizations, the efficacy of which has already been proven (18-20).

The TPE program was based on a biobehavioral approach. The purpose of therapeutic education was to modify the erroneous beliefs of pain and disability, as well as coping strategies and self-efficacy through a graded activity. Five TPE talks were given to the patient during the first 5 sessions with a duration of 15 minutes each. These talks were supported with a PowerPoint presentation including images and diagrams for better understanding by the patient. During the first session, the physiotherapist explained how to maintain good ergonomics.

**Table 2.** Treatment Scheme

Session Number	Treatment Scheme
<b>1</b>	Manual therapy techniques (25 min) TPE: how to maintain good ergonomics (15 min)
<b>2 to 5</b>	Manual therapy techniques (25 min) TPE: explanation of cervical motor behavior and the neurophysiological bases of pain (15 min)
<b>6 to 9</b>	Manual therapy techniques (20 min) MCTE: exercises were gradually added (20 min)
<b>10 and 11</b>	Manual therapy techniques (20 min) MCTE: check of the correct performance of exercises. Home exercises 5 a week

Abbreviations: MCTE, Motor control therapeutic exercises; TPE, Therapeutic patient education.

In the next 4 sessions, the therapist simply explained the cervical motor behavior, the neurophysiological bases of pain and the importance of patient's involvement in treatment. Gradual exposure was also emphasized, and relevant strategies were explained to the patient. Furthermore, self-treatment techniques were explained, such as stretching, auto-traction, diaphragmatic breathing and relaxation techniques (Jacobson relaxation technique), to provide coping strategies for patient and reduce her focus on pain. At the beginning of each session, the physiotherapist ensured that the patient had no doubts about the information presented in the last session.

The MCTE is based on retraining cervical muscles and includes (21): 1) craniocervical flexors exercise; 2) co-contraction of the flexors and extensors; and 3) a synergy exercise for retraining the strength of superficial and deep flexor. The MCTE taught in the clinic and is prescribed for home. These exercises were gradually added with between six to nine sessions. The physiotherapist asked the patient at the first session of MCTE to perform five sets of isometric contractions of deep flexors and extensors of the neck for 8-10 seconds. Based on this, for three sessions, the physiotherapist added load to the exercises. From the tenth session, the patient performed the exercises alone at home for a minimum of five times a week. The patient was asked not to stop performing exercises during the follow-ups.

#### 2.4. Follow-up and Outcomes

The patient performed 11 sessions of treatment. The measurement outcomes were taken at a minimum of 48 hours after treatment, and never on the same day. Table 1 shows the results in the consecutive follow-ups. The headache frequency between the first and second assessment sessions was 11 of 28 days, and that between the second and third sessions was 5 of 42 days. Finally, between the

third and fourth sessions, the frequency of headache was 2 of 89 days. The patient progressively reduced the use of non-steroidal drugs during the treatment to the point of not taking them and using them only as a rescue in case of severe headache.

### 3. Discussion

This case report provided a detailed description of the assessment and successful evolution of a female adult patient with CTTH treated with multimodal therapy based on a biobehavioral approach. Some biobehavioral treatments demonstrated effectiveness in the treatment of migraine (22) and CTTH (23). We have not found any treatments combining physical rehabilitation with biobehavioral methods for CTTH in the current literature, but there is scientific evidence that proves the effectiveness of physical rehabilitation based on a biobehavioral approach to other musculoskeletal disorders (24-26).

The evolution of headache frequency was very good during the treatment period. We observed a progressive decrease in each of the periods of assessment, and the same happened with the impact of headaches on quality of life of patients and the level of neck disability. According to the data recorded in the HIT-6, the headaches had a severe impact in the beginning, but they finally had little or no impact. Regarding neck disability, the patient was classified at T0 with a mild disability (14 points) and at T3 as not having any disability (4 points). This decrease in disability is considered a minimum clinically important difference (27).

The level of pain catastrophizing showed that at the beginning of treatment, the patient's level was very high and from a clinical point of view, this construct should be given much attention. Pain catastrophizing is defined as a cognitive factor that implies a mental negative perception or exaggeration of the perceived threat of either a

real or anticipated pain experience (28, 29). This psychological construct is associated with motor disturbances, such as decreased function, hindered performance of daily life activities, limitation of exercise capacity, increased recovery time, disability and higher drug intake (30-34). Reduction in PCS test results could be explained by the intervention of TPE, since cognitive interventions grant the patient a series of coping strategies for modifying their pain beliefs and maladaptive attitudes (35). The intensity of pain initially reported by the patient (headache: 80 mm; neck pain: 55 mm) resolved almost entirely at the last assessment (headache: 2 mm; neck pain: 0 mm), which is considered a clinically relevant difference (35-37). Finally, the time the patient maintained the cranio-cervical flexion position from T0 to T3 increased markedly (from 3 s to 32 s) to a value very close to those obtained from asymptomatic subjects ( $38.95 \pm 26.4$ ) (17). According to recent evidence, increased neck flexor endurance is crucial for improving patients with CTTH (38).

Lack of long-term follow-up could be a limitation, and we only considered this treatment in a short-medium term. Another limitation was monitoring used medications, since the patient told she was progressively reducing it, but the authors did not know for sure and this may affect the outcome measures. A female adult patient with CTTH treated by pharmacological and massage interventions with no improvement in the medium- and long-term was described. A multimodal physical rehabilitation treatment based on a biobehavioral approach, combining MT, TPE and MCTE, produced a substantial reduction in pain intensity, pain catastrophizing, disability and the impact of headaches on the patient's life, as well as enhanced neck flexor endurance. Further research in large samples is necessary to assess the effectiveness of a multimodal physical rehabilitation treatment based on a biobehavioral approach in the treatment of patients with CTTH.

## Footnote

**Authors' Contribution:** All authors (Hector Beltran-Alacreu, Ibai Lopez-de-Uralde-Villanueva, Roy La Touche) contributed to and agreed on the content of manuscript and reviewed and approved the final submitted version.

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