



Development of a Headache Diary and Assessment of Tension-Type Headache Diagnostic Criteria and Oral Behaviors, Joint Range of Motion, and Tenderness to Palpation: An Observational Study

Ada M. González-González, PhD, and Azael J. Herrero, PhD

ABSTRACT

Objective: The aim of this study was to design and use a headache diary in patients with frequent tension-type headaches (TTH). Another aim was to assess the relationship among oral behaviors, range of motion, and tenderness to palpation of the craniomandibular muscles.

Methods: Thirty-four patients participated in this prospective observational study for a 3-month period at the Adavall Clinic for Physiotherapy and Rehabilitation (Valladolid, Spain) in 2019. Oral behaviors were collected through the Oral Behavior Checklist in the Adavall-TTH diary. Range of motion was measured in the cervical region and in the temporomandibular joint. Tenderness to palpation was measured on 38 myofascial trigger points of the craniomandibular region.

Results: Oral behaviors were directly related to the pain intensity of TTH, the number of days, and the headache diagnostic criteria. Cervical range of motion was indirectly related to the intensity of TTH and the number of days of TTH (from $r = -0.341$ to $r = -0.418$, $P < .05$). Tenderness to palpation was associated with intensity and different diagnostic criteria of TTH in different craniomandibular muscles (from $r = 0.342$ to $r = 0.400$, $P < .05$).

Conclusion: We found associations between examination findings and TTH diagnostic criteria. The headache diary may be a useful tool in the diagnosis and management of TTH and for analyzing the relationship between oral activities and temporomandibular joint tenderness in TTH. Future research should test the validity and reliability of this diary. (*J Chiropr Med* 2024;23:37-46)

Key Indexing Terms: *Headache; Pain; Trigger Points; Temporomandibular Joint*

INTRODUCTION

The Global Burden of Disease study has documented that headache is a major health concern.¹ Primary headaches are a pathology by themselves, while secondary headaches are a consequence of other conditions. Among primary headaches, tension-type headache (TTH) is the most prevalent, and, according to the International Classification of Headache Disorders, third edition (ICDH-III), TTH can be divided into the following 4 types based on the characteristics of the episodes: infrequent episodic,

frequent episodic, chronic, and probable.² All types of TTH meet the same diagnostic criteria according to the ICDH-III: lasting from 30 minutes to 7 days, with at least 2 symptoms (bilateral, pressing or tightening [not throbbing], mild or moderate in intensity and not aggravated by usual physical activity); without nausea or vomiting; and may be associated with photophobia or phonophobia, but not both. Infrequent episodic TTH occurs less than 12 days a year, whereas frequent episodic TTH occurs between 12 and 180 days a year, and chronic TTH occurs more than 180 days a year. Probable TTH is diagnosed when all but 1 of the criteria are met and no other diagnosis has been made.²

Episodic TTH is the most prevalent, being reported by over 70% of some populations, with an average of 42% in adults, slightly higher in women than in men.³ Diagnosis is essential to guide a treatment focused on reducing the symptoms, frequency, and duration of headache episodes.

Headaches are diagnosed via taking into account their symptoms and the ICDH-III criteria. Health professionals collect information from patients' medical history and from

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clinical interviews. Sometimes, the professional uses questionnaires to obtain more detailed information. The Headache Disability Inventory⁴ and the Migraine Disability Assessment⁵ are some examples. Because these questionnaires can be biased by memory, some authors have proposed the headache diary as a useful tool for the primary-type headache diagnosis. Although Russell et al⁶ developed the first headache diary in 1992, its application is not frequent nowadays, despite being a useful instrument for knowing the frequency, precipitating factors, and excess medication. It also allows taking into account the symptoms, onset, and exacerbation conditions and the response to treatment over time.^{7,8} However, Rothrock et al⁸ proposed that for the correct diagnosis of each primary headache, a specific diary should be created according to the headache's clinical characteristics. Following this suggestion, we propose a new screening instrument that includes all the diagnostic criteria of TTH and allows the registration of each headache episode. We have named it the Adavall-TTH, creating the name from the clinic where it was performed (Adavall Physiotherapy) with the pathology for which it is intended (TTH) ([Supplementary Data](#)).

Several studies point to the activation of myofascial trigger points (MTP) as one of the possible causes of TTH and that its deactivation could reduce pain in the short term.⁹ In addition, it has been shown that there is an increased tenderness to palpation (TTP) of these points in patients with active MTP.¹⁰ Furthermore, MTP activation can cause changes in the range of motion (ROM) of the craniomandibular sphere and cause a change in the oral activities of patients. Until now, it has been suspected that impaired ROM or muscle discomfort can trigger TTH. However, the reverse sequence can also occur, being the TTH trigger for these limitations and changes in certain oral behaviors (OB). Thus, the aims of this study were to design and use a headache diary in patients with frequent TTH for 3 months and to assess the TTH relationship with OBs, ROM, and TTP of craniomandibular muscles.

METHODS

Participants

Recruitment was carried out over a 3-month period at the Adavall Clinic for Physiotherapy and Rehabilitation (Valladolid, Spain) in 2019. During this period, all patients with headache complaints completed the Adavall-TTH diary. After this period, patients who reported sufficient headaches to be classified as TTH were enrolled in the study for in-clinic testing. For the patient to be diagnosed with TTH, each episode was analyzed to know if it met all the ICDH-III² diagnostic criteria. The final diagnosis was made by adding the total number of episodes experienced by the patient during the period analyzed. Patients diagnosed with frequent episodic TTH were included in the

study. As a result, 38 patients met the following inclusion criteria: (1) having had from 1 to 14 headache episodes per month during the past 3 months, (2) not aggravated by usual physical activity, and (3) older than 18 years. The exclusion criteria were as follows: (1) metabolic, cardiovascular, or psychiatric disease; (2) cancer; (3) being pregnant or breastfeeding; and (4) receiving another headache treatment.

All patients were informed about the study's risks and benefits and were given their written informed consent to voluntarily participate. [Figure 1](#) shows the recruitment process. The Research Ethics Committee of the ASPAYM Castilla y León Foundation approved the study (code: CE-APSCYL-11201901).

Thirty-four patients completed the study; characteristics are shown in [Table 1](#). Two patients were excluded because they were receiving another headache treatment that might have influenced their results, and another 2 patients were excluded because they had metabolic, cardiovascular, or psychiatric disease.

Design

In this prospective observational study, participants with undiagnosed headache were given a headache diary to complete for 3 months. During the last week of this period, TTP of craniomandibular muscles, TTP of the craniomandibular muscles, the temporomandibular joint (TMJ) and the ROM of the cervical spine, and oral activities were assessed in the patients by a physiotherapist.

Headache Diary

Although various headache diaries have been used in previous studies, these often included symptoms of other headache types,¹¹ were non-specific in terms of the grading of headache symptoms,¹² or were not specified by authors.^{13,14} Thus, the Adavall-TTH diary was designed like a record sheet in which TTH diagnostic criteria were collected. Initially, our headache diary was composed of the following 6 variables: presence of headache, intensity, duration, quality, limitation of activity, and presence of symptoms. The diary was sent to 4 expert clinicians to evaluate its content validity, assessing all variables' sufficiency, clarity, and relevance. Relevance was assessed in an ordinal scale from 1 (not relevant) to 4 (very relevant). The experts' profile and their suggestions are shown in [Figure 2](#).

The final diary included 3 more variables: pain areas, medication used, and medication usefulness. In order to facilitate the indication of painful areas to the patient, both an image with numbered areas and a numeric pain scale were added. The headache diary was presented as a recording sheet, which collects information for 31 days, so patients had to fill in 3 sheets during the study. On the back side of the sheet, instructions explaining the recording sheet

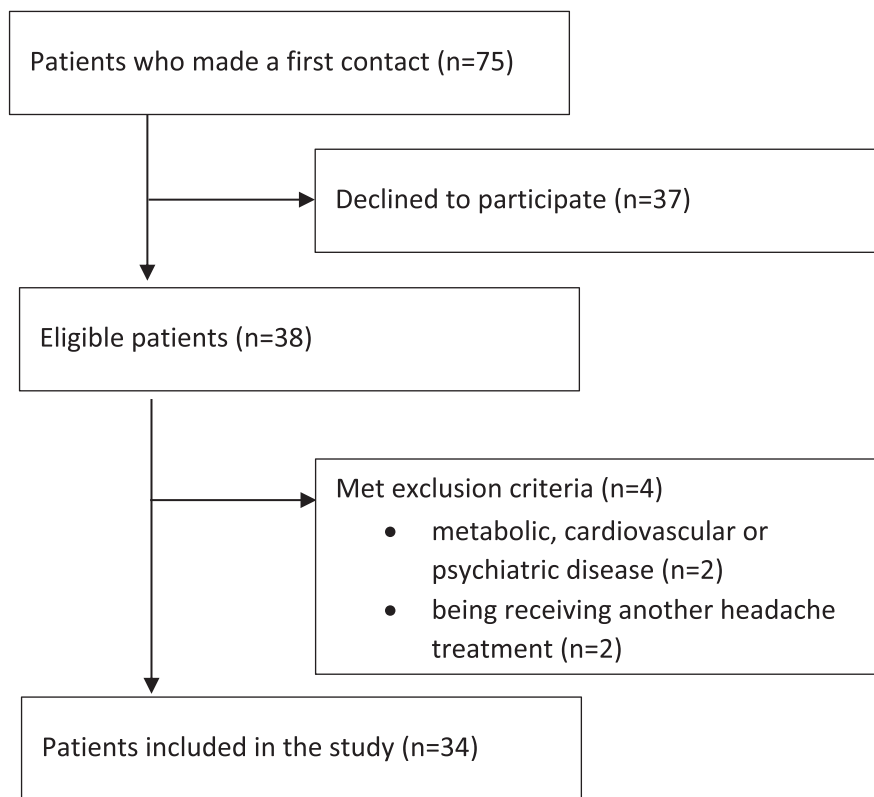


Fig 1. Recruitment process of the participants.

were included. Patients were instructed to have the diary near their bed and complete it at the end of the day before going to sleep. If they had not had any episode, they only had to mark “no” in the first column. In the case of women, they were instructed to circle the days they got their period. Finally, the information registered by the Adavall-TTH diary allowed us to diagnose each episode as TTH or no-TTH, following the ICDH-III criteria.²

Table 1. Characteristics of the Participants (32 female and 2 male)

Variable	Value
Age (y)—mean (SD)	41.2 ± 14.7
Height (m)—mean (SD)	1.65 ± 0.06
Weight (kg)—mean (SD)	62.3 ± 14.9
Headache days in the study (% of total)	22.5
Number of TTH days	9.3 ± 8.7
Number of no-TTH days	3.8 ± 7.6
Number of probable TTH days	7.2 ± 5.8

TTH, tension-type headache.

Measurements

The variables to be studied in relation to the diagnosis of TTH were TTP of the MTP, TMJ and cervical spine ROM, and OB. The assessment was performed during the last week of the 3 screening months by an experienced physiotherapist (10 years of expertise). Variables are described in the same order as they were measured.

Oral Behavior. Oral behavior was assessed using the Oral Behavior Checklist.¹⁵ This 21-item checklist assesses the frequency of some activities while sleeping (ie, clench or grind teeth) as well as during the waking hours (ie, hold or put jaw forward or to the side) on an ordinary scale from 0 to 4. The value analyzed was the sum of the observed frequency of each item for the whole group of participants.

Range of Motion. Cervical ROM was evaluated using a goniometer (Rulong Branch and Fulcrum Goniometer 180° with 1-degree interval[s]). Flexion, extension, rotations, and inclinations were registered in the cervical region. The ROM of the TMJ was measured using the TheraBite (CPT 95851; Great Lakes Orthodontics Ltd), which allowed us to register active free opening, maximum active opening, maximum assisted opening, protrusion, and right and left mandibular lateralization. Each movement was registered twice, and the mean was analyzed.

Tenderness to Palpation. Tenderness to palpation was measured with a 1 cm² hand-held algometer (B1532-

Expert Professional profile	Feedback
Stomatologist, dentist, with more than 25 years of professional experience.	The patient should explain if there was pain at the level of the temporal or masseter muscles and at the temporomandibular joint.
Stomatologist, dentist, with more than 25 years of professional experience.	Tinnitus should be included as symptom. Include a column where the location of the headache (frontal, temporal irradiated from the preauricular area, neck and neck) can be indicated.
Bachelor of Surgery and Medicine, Neurologist, with more than 15 years of professional experience.	The diary is quite complete but maybe it could take much time for the patient to complete it.
Dentist with more than 15 years of professional experience.	A pain scale could be included so that a numerical value of the level of pain of the patient can be obtained. It would be accompanied by images of faces that would facilitate the respondent to locate the pain.

Fig 2. Feedback provided by the experts who analyzed the content validity of the headache diary.

10158; BASELINE). The patient was instructed to indicate when pressure caused pain. This assessment was performed on the MTPs of the craniomandibular region muscles, bilaterally: masseter, temporalis, trapezius, digastric, levator scapulae, semispinalis capitis, sternocleidomastoid, rectus capitis posterior minor, and obliques capitis superior. Each point was pressed twice, and the mean recorded pressure (kg/cm²) when the patient-reported pain was analyzed. In addition, in each MTP, the chiropractor asked the patient if the pain was familiar (recognized as usual), referred pain, or both.

Statistical Analysis

All data were registered with Microsoft Excel and analyzed with SPSS v27. In order to analyze the relationship between the Adavall-TTH diary and OB, ROM, and TTH and TTP variables, Spearman’s rho correlation coefficients were applied. The reliability of ROM and TTP was analyzed with the intraclass correlation coefficient (ICC_{2,1}). ICC values less than 0.5, between 0.5 and 0.75, between 0.75 and 0.9, and greater than 0.90 were indicative of poor, moderate, good, and excellent reliability, respectively.¹⁶

In all cases, a 0.05 level of significance was used. The values of the variables are presented as mean ± SD for the continuous variables and as median ± IQR for the ordinal variables.

RESULTS

The results registered by the Adavall-TTH diary are shown in Table 2. Regarding symptoms’ presence, the

percentage out of the total number of patients who revealed them was included.

Relationship Between OBs and Adavall-TTH Diary

The OB results are shown in Table 3. When patients were asleep, only the item “sleep in a position that puts pressure on the jaw (for example, on stomach, on the side)” presented an indirect correlation with headache intensity ($r = -0.365, P = 0.034$).

When patients were awake, more relationships were observed. The items “clenching teeth together during waking hours” ($r = 0.359, P = .037$), “hold, tighten, or tense muscles without clenching or bringing teeth together” ($r = 0.348, P = .047$), and “hold or jut jaw forward or to the side” ($r = 0.343, P = .047$) showed a relationship with the number of days with headache. The item “use chewing gum” was related to other headaches different from TTH ($r = 0.365, P = .034$). The item “clenching teeth together during waking hours” showed a correlation with TTH diagnosis ($r = 0.352, P = .041$).

According to ICDH-III diagnosis criteria registered by the Adavall-TTH diary, the following correlations were reported. The items “clenching teeth together during waking hours” ($r = 0.435, P = .010$), “hold or put jaw forward or one side” ($r = 0.537, P = .001$), “bite, chew or play with your tongue, cheeks or lips” ($r = 0.450, P = .008$), and “hold between the teeth or bite objects such as hair, pipe, pencil, pens, finger, fingernails, etc” ($r = 0.346, P = .045$) were related to the criterion “pain perceived as tension.” The item “hold telephone between your head and shoulders” showed a positive correlation with headache episodes longer than 30 minutes ($r = 0.435, P = .010$). The item

Table 2. Summary of the Information Registered by the Headache Diary ($n = 34$)

Variable	Mean \pm SD	Minimum	Maximum	95% CI
Presence of headache (% of total days)	22.5 \pm 14.6	3.3	77.2	17.4-27.6
Intensity of pain	5.8 \pm 1.3	3.1	8.0	5.4-6.2
Number of episodes lasting less than 30 min	3.7 \pm 5.4	0	27	1.8-5.6
Number of episodes lasting more than 30 min	15.4 \pm 12.3	0	66	11.1-19.7
Number of episodes perceived as tension	12.8 \pm 12.4	0	65	8.5-17.2
Number of episodes perceived as pulsatile	6.7 \pm 7.4	0	31	4.1-9.2
Limitation of activity (% yes with respect to total number of registers)	26.3 \pm 27.0	0	89	16.9-35.8
Presence of sickness (% of patients)	47			
Presence of vomiting (% of patients)	12			
Presence of photophobia (% of patients)	59			
Presence of phonophobia (% of patients)	47			
Presence of tinnitus (% of patients)	15			
Medication (% of days they used it)	59.0 \pm 37.9	0	100	45.8-72.3
Medication usefulness (% of days the medication was effective)	70.4 \pm 33.8	0	100	58.6-82.2

“place tongue between teeth” ($r = 0.447$, $P = .012$) was related to the criterion “not limiting the usual activities.” The item “bite, chew or play with your tongue, cheeks or lips” ($r = -0.425$, $P = .012$) was related to the presence of photophobia. The item “bite, chew or play with your tongue, cheeks or lips” ($r = -0.399$, $P = .020$) was related to the intensity of pain. Finally, the items “place tongue between teeth” ($r = -0.507$, $P = .002$) and “bite, chew or play with your tongue, cheeks or lips” ($r = -0.360$, $P = .036$) were related to the presence of phonophobia.

Relationship Between ROM and Adavall-TTH Diary

The results regarding ROM are shown in Table 4. An indirect correlation among cervical ROM, the days of headache, and TTH diagnostic criteria was observed. Thus, right cervical rotation ($r = -0.418$, $P = .014$) and right inclination ($r = -0.341$, $P = .048$) were related to the number of days with headache. Cervical extension showed a negative relationship with pain intensity ($r = -0.371$, $P = .031$). Finally, right inclination showed an indirect correlation ($r = -0.365$, $P = .034$) with the perception of pain as tension.

Relationship Between TTP of MTP and Adavall-TTH Diary

The results regarding TTP of MTP are shown in Table 5, which contains only the MTP data that showed a correlation with TTH diagnostic criteria. The TTP of the MTP in

the temporal muscle presented some positive correlations (from $r = 0.342$ to $r = 0.400$, from $P = .048$ to $P = .019$) with TTH diagnostic criteria. Consequently, right temporal muscle MTP1 was related to pain intensity ($r = 0.365$, $P = .034$), right temporal muscle MTP3 was related to perception of pain as tension ($r = 0.367$, $P = .033$), and left temporal muscle MTP3 ($r = 0.354$, $P = .040$) was related to the presence of photophobia.

In the right anterior digastric, a direct relationship between TTP of the MTP ($r = 0.342$, $P = .048$) and the presence of photophobia was reported. In the right minor posterior rectus muscle, a direct relationship between TTP of the MTP ($r = 0.400$, $P = .019$) and pain intensity was reported as well. Finally, a negative relationship was observed between TTP of the MTP in the masseter (right MTP A) and the number of days with headache ($r = -0.384$, $P = .025$).

DISCUSSION

The main findings of this study showed that (1) different OB were directly related to intensity, number of days, and TTH diagnostic criteria; (2) the cervical ROM was indirectly related to TTH intensity and the number of days; and (3) the TTP of the MTP was related to the intensity and different diagnostic criteria of TTH in different craniomandibular muscles.

Table 3. Summary of the Oral Behavior Checklist Data ($n = 34$)

Oral Behavior	Median \pm IQR	Mean
Activity during sleep		
Clench or grind teeth when asleep , based on any information you may have	2.0 \pm 3.0	1.9
Sleep in a position that puts pressure on the jaw (for example, on stomach, on the side)	4.0 \pm 1.0	3.1
Activity during waking hours		
Grind teeth together during waking hours	0 \pm 1	0.5
Clench teeth together during waking hours	1 \pm 2	1.2
Press, touch, or hold teeth together other than while eating (that is, contact between upper and lower body)	2 \pm 2	1.4
Hold, tighten, or tense muscles without clenching or bringing teeth together	1 \pm 2	1.2
Hold or jut jaw forward or to the side	0 \pm 0	0.2
Press tongue forcibly against teeth	0.5 \pm 2	0.9
Place tongue between teeth	0 \pm 1	0.5
Bite, chew, or play with your tongue, cheeks, or lips	1 \pm 2	0.9
Hold jaw in rigid or tense position, such as to brace or protect the jaw	0 \pm 1	0.4
Hold between the teeth or bite objects such as hair, pipe, pencil, pens, fingers, fingernails, etc	0 \pm 1	0.5
Use chewing gum	1 \pm 2	1.0
Play musical instrument that involves use of mouth or jaw (for example, woodwind, brass, string instruments)	0 \pm 0	0.1
Lean with your hand on the jaw, such as cupping or resting the chin in the hand	1 \pm 2	1.2
Chew food on one side only	1 \pm 1	1.5
Eating between meals (that is, food that requires chewing)	2.5 \pm 3	2.1
Sustained talking (for example, teaching, sales, customer service)	0 \pm 1	0.7
Singing	1 \pm 1	1.4
Yawning	1 \pm 1	0.9
Hold telephone between your head and shoulders	1 \pm 2	1.0
Total score	23.0 \pm 11	23.7

This study suggests that the Adavall-TTH diary can be used as a self-report method in patients with non-diagnosed headaches. It has also been proposed to use electronic diaries¹⁷ to record headache episodes at the time of its onset.¹⁸ However, we recommend that it be completed at the end of the day so that the patient knows whether the episode has interfered with usual daily activities. Therefore, in this study, the paper record sheet format was used due to its simplicity and the difference in the ages of the patients. In addition, it measures the use of 9 variables, not as in previous studies, in which the diary was only used to measure

number of headache days per month, number of headache and trigger pairings, and number of triggers that occurred without a headache occurring on the same day.¹⁹ Regarding the variables studied, the main findings are described in the following.

The Oral Behavior Checklist showed that sleeping in lateral decubitus or prone was inversely related to headache intensity. Although, to the authors' knowledge, no study has reported a relationship between sleeping position and TTH, sleep time has been shown to influence its presence in people with chronic headache,²⁰ which is reinforced by

Table 4. Range of Motion of the Cervical Spine and Temporomandibular Joint (n = 34)

Movement	Mean ± SD	Minimum	Maximum	95% CI
Cervical spine flexion (°)	43.2 ± 11.1	20	65	39.1-47.4
Cervical spine extension (°)	35.5 ± 9.7	17	53	31.9-39.1
Cervical spine right rotation (°)	58.9 ± 10.8	42	90	55.0-63.0
Cervical spine left rotation (°)	58.8 ± 8.7	43	82	55.5-62.0
Cervical spine right inclination (°)	27.2 ± 8.8	14	56	23.9-30.5
Cervical spine left inclination (°)	26.4 ± 7.3	13	38	23.7-29.1
Active mouth opening (mm)	37.7 ± 5.3	28	49	35.7-39.7
Maximum active mouth opening (mm)	43.6 ± 7.2	20	54	40.9-46.3
Maximum assistive mouth opening (mm)	46.0 ± 5.7	32	55	43.9-48.1
Mandibular protrusion (mm)	5.8 ± 1.7	1	9	5.1-6.4
Mandibular right lateralization (mm)	10.0 ± 3.0	5	19	8.9-11.1
Mandibular left lateralization (mm)	9.5 ± 3.2	2	14	8.3-10.7

the fact that headaches could also be related to other factors such as insomnia or quality of sleep.²¹ The fact that the lateral decubitus position reduced the intensity of TTH may be due to the fact that it is considered the optimal position for sleeping since it improves the alignment of the spine, facilitates breathing, and decreases apnea. Regarding the prone position, this relationship should be studied since this position has classically been considered harmful due to the excess pressure applied to the TMJ.

Table 5. Pain Pressure Threshold (in kg/cm²) of the MTPs That Correlated With the TTH Diagnostic Criteria (n = 34)

MTP	Mean ± SD	Minimum	Maximum	95% CI
Right anterior digastric	0.8 ± 0.4	0	1.4	0.6-0.9
Right masseter MTP A	0.7 ± 0.3	0	1.3	0.6-0.8
Right minor posterior rectus muscle	0.9 ± 0.3	0	1.4	0.8-1.0
Right temporal MTP1	0.9 ± 0.4	0	1.5	0.7-1.0
Right temporal MTP3	1.0 ± 0.5	0	1.6	0.8-1.2
Left temporal MTP3	0.8 ± 0.5	0	1.5	0.7-1.0

MTP, myofascial trigger point; TTH, tension-type headache.

OB, such as clenching the teeth with or without tensing muscles or keeping jaw position, were related to the number of days of headache. Numerous studies have already demonstrated the relationship between TTH and the activity of clenching the teeth through the examination of masticatory muscles, although there is no consensus on it; some authors suggest that this activity does not trigger TTH episodes in healthy individuals,²² others present it as of little importance,²³ and a third group suggests that the pericranial sensitivity of MTPs should be taken as a diagnostic criterion.²⁴ However, the most widespread idea is perhaps that the involuntary contraction of craniomandibular muscles, as can occur when clenching the teeth, is due to mechanical or psychological stress, and it causes the activation and chemical sensitization of the myofascial mechanoreceptors and their afferent fibers.²⁵ This activity, as well as the maintenance of the mandibular position, may be related to the number of headache days since these positions can increase the masseter's muscle activity, which has been seen to be an aggravating factor in individuals with TTH.²⁶ The fact that "clenching teeth together during waking hours" showed a correlation with the number of days of headache supports the suggested argument. Curiously, chewing gum is related to other headaches different from TTH, which, as some authors have pointed out, may be because of this habit's relationship with some types of headache that may be due to this joint's overuse, such as headaches attributed to temporomandibular disorders.²⁷⁻²⁹

Oral behaviors, such as clenching the teeth with or without tensing muscles as well as keeping jaw position, were also related to the perception of pain as tension. The pain in

headaches can be perceived as tension or as pulsatile. The perception of tension occurs in TTH and can be defined as an “oppressive” type of pain that feels like a band around the head that oppresses it at the forehead and eyes level. The perception of pulsatile pain occurs in other headaches, being characteristic of migraine (throbbing pain). It is located in a specific area, and pain is perceived as a pulsation or heartbeat. Therefore, the reason patients in this study showed a direct relationship between OB and pain perceived as tension can be due to the fact that OBs cause bilateral muscle activation, which could favor the appearance of myofascial syndromes, and trigger points activation, which are closely related to TTH development.^{30–32}

The presence of photophobia and phonophobia were indirectly related to biting, chewing, or playing with the tongue, cheeks, or lips. Although there are no studies that link this fact with TTH or with other primary headaches in the case of migraine, there are more studies on photophobia and phonophobia as predictive characteristics.^{33,34} A possible explanation for this fact may be that the trigeminal nerve (V pair) is divided into 3 branches: the ophthalmic (V1), the maxillary (V2), and the mandibular (V3). The latter is responsible for the innervation of the cheeks, tongue, and the ear auricle.³⁵ For this reason, the activation of this branch by activities such as biting, chewing, or playing with the tongue can increase the motor inputs of the V3 and decrease those of the V1 or the V3 sensory branches. However, more studies are needed to know OB that are related to TTH and how to reduce them.

The cervical ROM of right rotation and right inclination was indirectly related to the headache’s intensity and number of days. A previous study already showed this relationship,³⁶ and on top of this, other authors indicate that individuals with TTH manifested high frequencies of neck pain and disability.^{37,38} It could indicate that this decrease in movement is a consequence of deterioration in the trapezius muscular function, as some authors have already described.¹⁰ This could be useful since a decrease in cervical ROM could be used as a predictor and alert factor for TTH.

The TTP of the MTP mainly showed a direct relationship with different muscles. Temporalis muscle MTPs were related to the intensity of TTH, pain perceived as tension, and presence of photophobia. The connection with intensity has been previously studied in patients with chronic TTH,³⁹ while photophobia and the definition of pain as tension may be a consequence of the convergence of nociceptive afferents in the nucleus caudalis.^{32,40} Until now, the relationship between the anterior digastric and TTH has not been studied. The direct relationship it presents with photophobia may be due to the fact that this muscle is innervated by the mylohyoid nerve, a branch of V3 and that both the inputs of this muscle and the V1 branch are integrated into the caudal nucleus of the ipsilateral trigeminal nerve.⁴¹ The relationship of the right minor posterior rectus with intensity could be due to 2 situations.

The first is that this muscle joins the dura through the myodural bridge, which could facilitate the sending of painful inputs.⁴² The second possible cause is the disuse or muscle avoidance behavior of this muscle in TTH.⁴³ The relationship between the masseter and the number of days of headache presents contradictory results with respect to those found in the present study, as some authors point out to a direct relationship.⁴⁴ However, the connection found may be due to this muscle being defined as the most sensitive, and it can be related to other types of headaches.⁴⁵

Limitations

The main limitation of this study was that OB, ROM, and TTP of the MTP were not always measured when the patients had a TTH episode. This was not possible because patients were assessed in the rehabilitation clinic, so variables were decided to be registered at the same time during the 3 months patients were completing the Adavall-TTH diary. The small sample size may also have influenced the observation of fewer significant relationships. Another limitation is that the results from the 3-month period were extrapolated to a 12-month period, as ICDH-III states that frequent episodic TTH corresponds to between 12 and 180 days a year with headache. We did not test the validity or reliability of this tool; therefore, future studies should test the validity and reliability of this headache diary.

CONCLUSION

The Adavall-TTH diary, designed and used in the present study to register diagnostic criteria of TTH, was an easy and useful tool. This diary collected data associated with different OBs, cervical ROM, and TTP of the TMJ muscles, and it seems to be potentially useful in the clinic. The next step should be a research study to test the validity and reliability of this diary.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found in the online version at [doi:10.1016/j.jcm.2024.02.003](https://doi.org/10.1016/j.jcm.2024.02.003).

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CONTRIBUTORSHIP INFORMATION

Concept development (provided idea for the research): A.M.G.-G., A.J.H.

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Data collection/processing (experiments, organization, and reporting data): A.M.G.-G.
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Practical Applications

- The aim of this study was to design and use a headache diary in patients with frequent tension-type headache (TTH).
- Another aim was to assess the relationship among oral behaviors, range of motion, and tenderness to palpation of the craniomandibular muscles.
- This diary may be a useful tool in the diagnosis and management of TTH and for analyzing the relationship between oral activities and temporomandibular joint tenderness in TTH.

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