

Active myofascial trigger points in head and neck muscles of patients with chronic tension-type headache in two primary health care units in Tshwane

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Background: The management of patients presenting with chronic tension-type headache (CTTH) can be challenging for primary health care practitioners. As with most chronic pain disorders, a multimodal management approach is frequently required. It has been postulated that myofascial pain syndrome (MPS) and its hallmark myofascial trigger points (MTrPs) found in specific muscle tissues may play a role in the chronic pain experienced by patients with CTTH. Little is known about the prevalence of MTrPs in patients with CTTH, in primary health care settings on the African continent. This study therefore aimed to investigate the prevalence of active MTrPs in specific head and neck muscles/muscle groups in patients with CTTH.

Methods: A prospective, cross-sectional and descriptive study was done in two primary health care facilities situated in Tshwane, South Africa. The sample included 97 adult patients with CTTH. Five head and neck muscles/muscle groups were examined bilaterally for active MTrPs. Outcome measures were the prevalence and distribution of active MTrPs in these patients.

Results: Active MTrPs were found in 95.9% of the patients, the majority (74.2%) having four or more active MTrPs. The temporalis muscles and suboccipital muscle group exhibited the highest number of active MTrPs (prevalence 87.6% and 80.4% respectively).

Conclusion: Our study suggests a strong association between MPS and CTTH in patients, presenting in the primary health care setting. This indicates the importance of a musculoskeletal assessment of neck and pericranial muscles in patients with CTTH. This can assist in determining the most appropriate treatment strategy in these patients.

Keywords: chronic pain disorders, chronic tension type headache (CTTH), myofascial pain syndrome (MPS), myofascial trigger points (MTrPs), primary headache

Introduction

In clinical practice, the generalist doctor is frequently required to manage a patient with a chronic primary headache disorder. Management of chronic tension-type headache (CTTH), with a one-year period prevalence of 0.9–2.2% in European and American studies,^{1,2} can in particular be challenging. It is generally accepted that chronic pain disorders, such as CTTH, require a multi-modal management approach. A better understanding of the potential myofascial pain components in patients with CTTH will assist primary care physicians in the assessment and management of this common disorder.

The association between tension-type headache and myofascial pain syndrome (MPS) has been studied for many years. Researchers have observed an increased tenderness with palpation of pericranial myofascial tissue in patients with tension-type headache.³ It has also been suggested that pain from muscles in the head, neck and shoulders may be referred to the head and then be experienced as headache.^{4,5}

MPS is a common musculoskeletal pain disorder, the main clinical features being regional pain and muscle tenderness, associated with the presence of myofascial trigger points (MTrPs) and referred pain with palpation.⁵ This condition is a well-documented and accepted clinical entity that is frequently associated with headache disorders.⁵ MPS originates from MTrPs within muscles and surrounding tissue, such as ligaments and tendons.⁶

A MTrP is the clinical finding in patients with MPS and has been described by Simons et al.⁵ as a well-defined hyperirritable and painful area in a taut band of skeletal muscle. Active MTrPs are associated with a spontaneous pain complaint and digital compression of the trigger point elicits a pattern of non-dermatomal pain referral, which mostly coincides with the patient's pain symptoms. Latent MTrPs do not produce spontaneous pain and lack the referral pattern seen in active MTrPs.^{5,7,8} Simons et al. published a comprehensive manual of the patterns of referred pain from different MTrPs throughout the body.⁵

Active MTrPs may develop after an injury to muscle fibres, which may be a single traumatic event or repetitive micro-trauma to muscles, which then is followed by local muscle contraction.⁹ Sustained muscle contraction and shortening of sarcomeres lead to local ischaemia and release of several pro-inflammatory chemical mediators that may sensitise peripheral nociceptors. Microdialysis studies done in active MTrP areas have shown elevated levels of many chemical mediators such as tumour necrosis factor α (TNF α), interleukin 1β (IL- 1β), calcitonin-gene-related polypeptide (CGRP), substance P, bradykinin, serotonin and norepinephrine.¹⁰ These mediators in turn may sensitise neurons at the level of the dorsal horn in the spinal cord with resultant central sensitisation (if the peripheral sensitisation is sustained), and the formation of active MTrPs.^{5,9,11}

The following clinical criteria have been proposed for the diagnosis of MPS.⁵

- Major criteria:
 - regional pain complaint;
 - taut band in muscle if muscle is accessible to palpation;
 - exquisite tenderness at one point in the taut band;
 - referral of pain on compression of the MTrP.
- Minor criteria:
 - reproduction of the patient's pain complaint by pressure on the MTrP;
 - local twitch response (involuntary muscle contraction) elicited by snapping palpation or needling of the MTrP;
 - pain alleviation with injection of the MTrP with a local anaesthetic.

Currently there remains a need to develop an objective, laboratory diagnostic procedure to identify an active MTrP. Most researchers have in the interim used the following criteria.¹²

1. a regional pain complaint;
2. an exquisitely tender spot located in a muscle taut band (provided the muscle is accessible to palpation);
3. reproduction of the patient's usual pain complaint with single finger compression of the MTrP.

Since 2006, Fernandez-de-las-Penas et al. have published a number of studies examining various aspects of MTrPs in tension-type headache.^{13,14} They demonstrated in blinded controlled studies of patients with CTTH recruited from a hospital neurology department that palpation of active MTrPs in the upper trapezius, suboccipital, sternocleidomastoid and temporalis muscles produced referred pain which reproduced the patient's usual headache. In addition, they demonstrated that active as compared with latent MTrPs in the head and neck muscles examined were associated with greater headache intensity and frequency.^{13,14} Both Fernandez-de-las-Penas et al. and Danish researchers observed that active MTrPs were significantly more frequent in patients with CTTH than in control persons.^{13–15} A group of Korean researchers also found a significantly greater number of active MTrPs in patients with CTTH as compared to those with episodic tension-type headache, with no active MTrPs in the control group. This study was performed in a headache clinic based in a tertiary hospital.¹⁶

The relationship between MTrPs and CTTH has not yet been explored in the primary health care setting. This study therefore aimed to determine the prevalence of active MTrPs in specific head and neck muscles, in patients with CTTH presenting to primary health care facilities in Tshwane, South Africa.

Methods

A prospective, cross-sectional descriptive study was conducted in two urban primary healthcare settings located in the south-western district of Tshwane (Pretoria).

Adult patients (18 years and older) presenting to these facilities with chronic headache which had lasted longer than three months, were screened over an approximately two-year period using their headache history and a focused clinical examination. Those who fulfilled the criteria for CTTH according to the International Classification of Headache Disorders (ICHD), 2nd edition¹⁷ (3rd edition¹⁸ was published subsequent to this study being conducted) were invited to participate in the study. All

subjects had headache on at least 15 days per month for longer than three months. Headaches of the participants were bilateral with a pressing quality. A 0–10 pain intensity numeric rating scale (NRS) was used to assess the severity of headaches during the preceding four weeks. In keeping with the ICHD criteria for CTTH, the average headache intensity ratings by study patients varied from 1 to 6 on the NRS (which equates to mild to moderate pain). Patients were excluded from the study if the clinical evaluation was suggestive of a secondary cause of the headache, or another type of primary headache disorder such as migraine. Patients who were unable to adequately describe their pain experience due to cognitive impairment were also excluded.

Ninety-seven patients participated in the study. This was the minimum calculated sample size to determine active MTrP prevalence to an accuracy of 10% or smaller with 95% confidence.

All subjects gave written informed consent prior to participation in the study, which was approved by the Research Ethics Committee of the University of Pretoria.

A questionnaire was administered, which included basic demographic data as well as questions relating to headache characteristics and the use of analgesia.

This was followed by a musculoskeletal assessment to determine the presence and location of active MTrPs. Specific head and neck muscles/muscle groups, namely temporalis, upper trapezius, occipitofrontalis, suboccipital and posterior cervical were systematically examined bilaterally. MTrPs were located through a flat palpation technique, described by Dommerholt et al.,¹⁹ using the index finger to apply pressure against the underlying bone to identify any exquisitely tender spot within each muscle. Once located, gradual compression, using a pressure algometer (Force Dial™ Algometer; Wagner Instruments, USA), was applied to the tender point to quantify and standardise the locally applied pressure. Compression lasted for at least 5 s to a maximum of 10 s and up to a maximum pressure of 4 kg/cm² (enough pressure to blanch the blood from the thumbnail).

For the purpose of this study, an active MTrP was identified when single finger palpation and pressure algometry of the above-mentioned muscles confirmed the presence of an exquisitely tender spot which was associated with pain referral and which the patient recognised as his/her usual headache complaint.

Each muscle/muscle group (both left and right side) was classified as either having an active MTrP or not. Therefore, a patient with one or more trigger points in each muscle/muscle group on both sides would be recorded as having a maximum of 10 active MTrPs.

Statistical analysis

Data were analysed using Stata® Release 8.1 Intercooled statistical software (StataCorp LP, College Station, TX, USA). Frequency distributions of CTTH patients' demographic parameters and active MTrP categories were done to determine the percentage of patients with active MTrPs in the respective muscles/muscle groups. The Chi-square, Fisher's exact and Student's t-tests were used to assess the influence of study variables, such as age, gender and frequent use of analgesic agents, on active MTrP frequency. Statistical analysis was conducted at the 95% confidence level and a *p*-value of less than 0.05 was considered statistically significant.

Results

The socio-demographic profile of the sample of 97 patients is shown in Table 1. Of note is that 86.6% ($n = 84$) of the patients presenting with CTTH were female. The mean age was 39.1 years with a standard deviation of 12.9.

One or more active MTrPs were identified in head and neck muscles of 95.9% ($n = 93$) of study patients, with the greater majority (74.2%) having four or more active MTrPs (Table 2).

found in the temporalis (87.6%) and suboccipital muscle group (80.4%) and in most muscles, active MTrPs occurred bilaterally.

Patient variables such as gender ($p = 0.42$), age ($p = 0.44$) and employment status ($p = 0.88$) were not shown to influence the presence of active MTrPs in head and neck muscles. The prevalence of active MTrPs was compared in the group of patients with CTTH who frequently used analgesic medication (65.98% of the sample) and those who did not. No significant

Table 1: Demographic characteristics of CTTH patient sample

Socio-demographic variable	Category	<i>n</i>	%
Gender	Male	13	13.4
	Female	84	86.6
Age (years)	18–29	26	26.8
	30–39	29	29.9
	40–49	18	18.6
	50–59	19	19
	> 60	5	5.2
	Employment status	Employed	61
	Unemployed*	36	37.1
Race	Black	55	56.7
	White	11	11.3
	Asian	26	26.8
	Mixed race	5	5.2
Total		97	

*Included students and pensioners.

Table 2: Number of active MTrPs per CTTH patient

Number of active MTrPs per patient	<i>n</i>	%
0	4	4.1
1–3	21	21.7
≥ 4	72	74.2
Total	97	

The average number of active MTrPs per patient was 4.9 (SD 2.43). Figure 1 illustrates the distribution of active MTrPs in the head and neck muscles that were examined. The most active MTrPs were

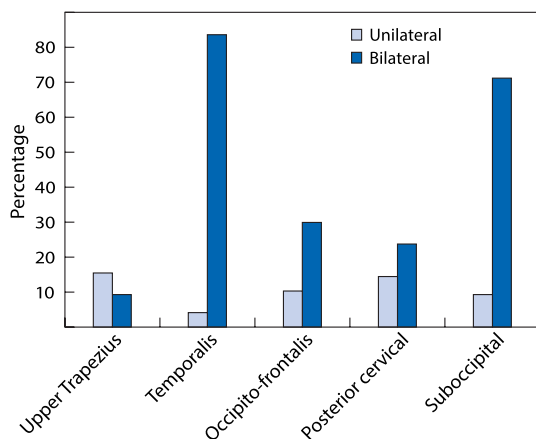


Figure 1: Percentage of CTTH patients with active MTrPs in different head and neck muscles.

difference was found in the presence of active MTrPs between these groups (OR 2.00; 95% CI 0.26–15.11) and $p = 0.49$. Patients with fewer (0–3) active MTrPs per patient with CTTH were compared with those with a greater number (4–10) trigger points. Here there was also no significant difference in the frequent and infrequent analgesic-use groups (OR 1.42; 95% CI 0.55–3.67) and $p = 0.47$.

Discussion

In this study of adult patients with CTTH presenting in two primary health care units, a substantial majority of patients were found to have one or more active MTrPs in the head and neck muscles that were examined. The overall prevalence of active MTrPs within our group of CTTH patients is higher than that found in previous tertiary hospital-based studies, in which 65–85% of patients with CTTH were shown to have active MTrPs.^{14,15} This high prevalence of active MTrPs in primary care patients with CTTH is not entirely unexpected since previous studies have confirmed that that MTrP pain is strongly associated with chronic tension-type and migraine headaches.⁵ Gerwin reported previously that 100% of patients with mixed tension-type/migraine headaches had active MTrPs.²⁰

Previous studies of active MTrPs in CTTH patients specifically reported the average number of active MTrPs found per patient. Comparisons in this regard are complicated by the fact that each study examined a different number of head and neck muscles. Studies of CTTH patients done in Spain and Korea found an average of 1.9 and 2.4 active MTrPs per CTTH patient respectively, when examining three to four head and neck muscles bilaterally.^{13,16} In a subsequent study led by the same Spanish researcher, a mean number of seven active MTrPs per CTTH patient were found when examining six head and neck muscles bilaterally.²¹ In the current study, which examined five head and neck muscles bilaterally, a mean number of 4.9 active MTrPs per CTTH patient was found. Of note is that a regional pain problem can be due to a single trigger point, although it is more commonly associated with multiple trigger points.⁸

In our study, the temporalis and suboccipital muscles were most likely to have active MTrPs (87.6% and 80.4% of patients respectively). The suboccipital muscles also exhibited the highest number of active MTrPs in one of the Spanish studies,²¹ unlike the Korean study, where the upper trapezius was more often involved (60.9% of patients) as compared with the suboccipital (26.1%) and temporalis (8.7%) muscles.¹⁶ Simons et al. have noted that the trapezius is probably the muscle that is most often affected by MTrPs.⁵ The relatively low prevalence of active MTrPs in the trapezius in our study may relate to differences in daily activities in our study population, compared with other study populations. It has been shown that high visual stress related to computer work resulted in an increase in trigger point development in the trapezius muscles.²² With over a third of our study sample being unemployed, computer work may feature less in the activities of our patients. In a study involving migraine headache patients, it was also the temporalis and suboccipital muscles in which the majority of trigger points were present.²³

While this and previous studies have demonstrated that by far the majority of CTTH patients have active MTrPs in their head and neck muscles, it has not been firmly established whether there is a direct causal link between the presence of MTrPs and CTTH. It has, however, been proposed that active MTrPs in head, neck and shoulder muscles are a source of ongoing peripheral and central sensitisation that may be at least partially responsible for chronic pain symptoms in patients with CTTH.²⁴ This contribution of active MTrPs to CTTH pain is supported by several other researchers in this field.^{6,16} It has also been suggested that early identification and interventions to address MTrPs in patients presenting with tension type headache may prevent progression to a more chronic headache disorder.⁵ It should, however, also be noted that the presence of MTrPs in patients with CTTH does not rule out the importance of other factors, such as psychological stress or anxiety and abnormal head posture, which may also exert their respective effects through the activation of MTrPs.¹²

The frequent use of analgesic medication, noted in 65.98% of our study sample, suggests an additional diagnosis of *medication-overuse headache* in some of these patients. In this particular study, we did not differentiate between CTTH and medication-overuse headache, because in clinical primary care practice, patients with chronic headaches mostly present with a combination of these. Indeed, the most recent ICHD (3rd edition)¹⁸ requires that patients meeting the criteria for CTTH who also overuse analgesic medication should be given a dual diagnosis of CTTH and medication-overuse headache. In this

study, no association was found between frequent use of analgesia and MTrP frequency in head and neck muscles.

It is notable that more than half of the patients presenting with CTTH were under 40 years of age, with most of the remainder being under 60 years. This emphasises the importance of effective management of this condition, which appears to be particularly prevalent in the population age group that is traditionally the most economically active. The predominance of female patients in the sample is in keeping with previous findings, where tension-type headache occurred more commonly in women than in men.²

A limitation of this study is the current absence of objective laboratory methods for identifying MTrPs. Their diagnosis currently relies solely on history and physical examination and is influenced by the skill and technique of the examiner.⁵ The reliability of MTrP diagnosis for the purpose of research should improve in future with evolving tools such as magnetic resonance elastography and high-resolution ultrasound imaging.¹² There are currently also no universally accepted validated clinical diagnostic criteria for MTrPs. There is therefore a need to develop consensus on the clinical features that are necessary to diagnose MPS.

Conclusion and recommendations

The results of this study indicate that active MTrPs in head and neck muscles of patients who present with CTTH in primary care are highly prevalent. This suggests that the frequent association between MPS and CTTH is not limited to more severe cases managed in secondary and tertiary care institutions. Therefore, in determining an appropriate treatment strategy for a patient with CTTH, a musculoskeletal assessment of the neck and pericranial muscles is essential and can often reduce the need for costly laboratory investigations and imaging.

It is recommended that active MTrPs should be treated as early and as effectively as possible to prevent potential sensitisation and chronification of pain.²⁴ Trigger point injections with lignocaine have been shown to be effective in providing relief of symptoms caused by active MTrPs and are currently the treatment modality with the best evidence of success when less invasive approaches such as physical therapy have failed.^{25,26} In a recent survey of American Headache Society members, three-quarters of responders indicated that they perform this intervention in patients with headaches, particularly in CTTH.⁷ With appropriate training, this intervention can be readily implemented by clinicians in the South African primary health care setting. Clinicians should simultaneously identify and address perpetuating factors such as abnormal posture, stress, mood disorders and poor sleep, which may contribute to MPS and MTrPs.⁶

Appropriate identification and management of MTrPs should contribute significantly to the multimodal management of this common and chronic headache disorder.

Conflict of interest – No conflict of interest to declare.

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