

Journal of Child Neurology

<http://jcn.sagepub.com>

Myofascial Trigger Points in Children With Tension-Type Headache: A New Diagnostic and Therapeutic Option

Celina von Stülpnagel, Peter Reilich, Andreas Straube, Jan Schäfer, Astrid Blaschek, Seung-Hee Lee, Wolfgang Müller-Felber, Volkmar Henschel, Ulrich Mansmann and Florian Heinen

J Child Neurol 2009; 24; 406

DOI: 10.1177/0883073808324540

The online version of this article can be found at:
<http://jcn.sagepub.com/cgi/content/abstract/24/4/406>

Published by:



<http://www.sagepublications.com>

Additional services and information for *Journal of Child Neurology* can be found at:

Email Alerts: <http://jcn.sagepub.com/cgi/alerts>

Subscriptions: <http://jcn.sagepub.com/subscriptions>

Reprints: <http://www.sagepub.com/journalsReprints.nav>

Permissions: <http://www.sagepub.com/journalsPermissions.nav>

Citations <http://jcn.sagepub.com/cgi/content/refs/24/4/406>

Myofascial Trigger Points in Children With Tension-Type Headache: A New Diagnostic and Therapeutic Option

Celina von Stülpnagel, MD, Peter Reilich, MD, Andreas Straube, MD, Jan Schäfer, PT, Astrid Blaschek, MD, Seung-Hee Lee, MD, Wolfgang Müller-Felber, MD, Volkmar Henschel, PhD, Ulrich Mansmann, PhD, and Florian Heinen, MD

The goal of this pilot study was to evaluate the effect of a trigger point-specific physiotherapy on headache frequency, intensity, and duration in children with episodic or chronic tension-type headache. Patients were recruited from the special headache outpatient clinic. A total of 9 girls (mean age 13.1 years; range, 5-15 years) with the diagnosis of tension-type headache participated in the pilot study from May to September 2006 and received trigger point-specific physiotherapy twice a week by a trained physiotherapist. After an average number of 6.5 therapeutic sessions, the

headache frequency had been reduced by 67.7%, intensity by 74.3%, and duration by 77.3%. No side effects were noted during the treatment. These preliminary findings suggest a role for active trigger points in children with tension-type headache. Trigger point-specific physiotherapy seems to be an effective therapy in these children. Further prospective and controlled studies in a larger cohort are warranted.

Keywords: tension-type headache; myofascial trigger points; physiotherapy

Headache in children is a leading concern for pediatricians. In a recent epidemiological study in Germany, the 6-month prevalence of headaches was 53.2% among children from 7 to 14 years.¹ It is estimated that about 20% of the children with primary headache need medical therapy.²

The pathogenesis of tension-type headache is not clearly understood. Patients with tension-type headache often report band-like tightness and increased tenderness of the pericranial muscles. Some authors claim that pain

from pericranial head, neck, and shoulder muscles refers to the head, which is then experienced as headache.^{3,4} Following this hypothesis, the pericranial myofascial tissue is considered of pathophysiological importance in tension-type headache.

Involvement of myofascial tissue in myofascial pain syndrome is apparently one of the most common causes of both chronic and acute musculoskeletal pain in general practice including lower back pain, cervical and neck pain, and headache syndromes. Myofascial trigger points are the clinical hallmark of the myofascial pain syndrome. In 1981, Simons developed the concept of the trigger point formation and set forth today's most accepted theory on pathogenesis of the myofascial pain syndrome, the so-called "integrated trigger point hypothesis"^{5,6} to explain the pathophysiological background of myofascial trigger points in myofascial pain syndrome. Myofascial trigger points are defined by the presence of a hyperirritable, palpable nodule within a taut band of muscle fibers associated with local tenderness, local twitch response, and referred pain pattern coming from the trigger point area and emanating into remote areas (the so-called referred pain pattern).

In recent years, several authors published certain evidence that there is a relationship between myofascial pain syndrome and tension-type headache in adults.

Received May 15, 2008. Accepted for publication July 25, 2008.

From the Department of Pediatric Neurology and Developmental Medicine, Dr von Haunersches Kinderspital, (CvS, JS, AB, S-HL, WM-F, FH), Department of Neurology (AS), Friedrich-Baur-Institute, Department of Neurology (PR), and Institute for Medical Informatics, Biometrics and Epidemiology (VH, UM), Ludwig-Maximilians-University Munich, Germany.

This pilot study (TRIKI) was supported by a grant from the Else-Kröner-Fresenius-Foundation (P20/05//A14/05//F00). The authors thank Christian Gröbli for his support of the TRIKI pilot study.

Address correspondence to: Florian Heinen, MD, Department of Pediatric Neurology and Developmental Medicine, Dr von Haunersches Kinderspital, Ludwig-Maximilians-University Munich, Lindwurmstr. 4, 80337 Munich, Germany; e-mail: florian.heinen@med.uni-muenchen.de.

Stülpnagel C, Reilich P, Straube A, et al. Myofascial trigger points in children with tension-type headache: a new diagnostic and therapeutic option. *J Child Neurol*. 2009;24:406-409.

Table 1. Demographic Data

Gender	9 Females, No Males
Age, y	13.1 y, range 5-15 y
Diagnosis	All tension-type headache, no combination with migraine Chronic TTH (f > 10 d/month): 3 Episodic TTH (f < 10 d/month): 6
Rescue medication (number of patients taking medication before TrP therapy)	Paracetamol: 2× Ibuprofen: 1×

Note: f, frequency; TrP, myofascial trigger point; TTH, tension-type headache.

These studies showed a correlation between myofascial trigger points and tension-type headache,⁷⁻¹⁴ thereby implementing a new pathophysiological concept and offering the chance of new therapeutic options in adults with tension-type headache.

Physiotherapy as the basic therapeutic approach for myofascial pain syndrome includes the general principles of restoration of the muscles to their normal length, posture, and full range of motion. Active and passive stretching of the muscles in addition to other augmentation techniques such as postisometric relaxation or reciprocal inhibition are quite effective. Local tissue stretch techniques include trigger point pressure release (ischemic myofascial trigger points compression) and deep-stroking massage with posttreatment surface heat or electrical stimulation. Most of these techniques have not yet been evaluated.^{15,16} Evidence-based recommendations level I are still missing.

To date, it has not been investigated how many children with tension-type headache show myofascial trigger points and whether these myofascial trigger points also play a role in generating headaches in children. Furthermore, no data evaluating the therapeutic effect of trigger point-specific physiotherapy among these children exist.

We therefore conducted a pilot study to investigate the efficacy and tolerability of trigger point-specific physiotherapy in 9 children with tension-type headache and myofascial trigger points.

Material and Methods

Patients were recruited from the special headache outpatient clinic. A total of 9 girls (mean age 13.1 years; range, 5-15 years) with the diagnosis of tension-type headache participated in the pilot phase from May to September 2006 (Table 1). The diagnosis of tension-type headache had been confirmed according to the criteria of the International Headache Society.¹⁷ To be noted was the fact that there was no combination with migraine. Secondary headaches had been ruled out by a thorough neurological

Table 2. Myofascial Trigger Points in the Pericranial Muscles (at the Beginning of Therapy)^a

	Sternocleidomastoideus Muscle	Trapezius Muscle	Splenius Muscle	Temporalis Muscle
Right	1	1	-	-
Left	3	-	-	-
Both	4	3	4	3
Latent trigger point	-	4	3	3

a. No myofascial trigger points were found in semispinalis, levator scapulae, masseter, and frontalis muscles.

examination, routine blood examination, ophthalmologic examination, and cranial magnetic resonance imaging (MRI). Informed consent was obtained before treatment and the study had been approved by the Ethics Committee of the University of Munich.

The presence of myofascial trigger points was evaluated according to the diagnostic criteria by Simons et al.⁶ The main criteria include "active" myofascial trigger points that are defined by the presence of a hyperirritable, palpable nodule within a taut band of muscle fibers associated with local tenderness, local twitch response, and referred pain pattern coming from the trigger point area and emanating into remote areas recognized by the patients as their familiar headache or as a part of the known headache pattern. The so-called "latent" myofascial trigger points are clinically silent and may result primarily in muscle tightness and dysfunction without the presence of spontaneous pain but could cause pain on palpation.⁶ Latent myofascial trigger points remained untreated among the study group.

The whole musculoskeletal examination was independently performed by 2 trained investigators blinded for each other's examination to evaluate the interrater reliability as described by Gerwin et al.¹⁸ Regarding the suboccipital muscles, we followed the guidelines as described by Fernández-de-las-Penas et al.⁸ For each patient, we examined the following muscles: sternocleidomastoid, splenius capitis, upper trapezius, temporalis, semispinalis, levator scapulae, masseter, and frontalis muscles (Table 2).

After diagnosis of active myofascial trigger points, patients were offered trigger point-specific physiotherapy twice a week for 1 hour each session over a 4-week period by the same therapist (J.S.). This standardized therapy includes the classical myofascial trigger point release techniques such as ischemic compression of the myofascial trigger points, and local stretching of the taut band, as well as active and passive stretching of the muscle combined with postisometric relaxation described by Simons et al⁶ and Hong.¹⁹

To evaluate the effect of the myofascial trigger point therapy, the patients had to keep a diary. Headache frequency (days/month), intensity (visual analog scale), duration (hours), and the use of rescue medication (which drug and dosage) had to be documented for every day for 4 weeks before treatment, during the treatment period, and up to the final visit, which was scheduled shortly after the last therapeutic session.

Table 3. Therapeutic Effect

	Before Therapy	After Therapy	Effect
Headache frequency	3.1 d/week (1.5-7)	1 d/week (0-3)	67.7% improvement
Headache intensity	6.5 visual analog scale (5.5-8.5)	1.67 visual analog scale (0-4)	74.3% improvement
Headache duration	6 h/d (1.5-12)	1.36 h/d (0-2.5)	77.3% improvement
Mean number of therapeutic sessions			6.5

Results

In our outpatient clinic, a subgroup of 30% of all evaluated children with tension-type headache also showed headache with active myofascial trigger points. By palpation, these myofascial trigger points produced consistent familiar headache in the patient. Clinical significance of active myofascial trigger points were shown in the following muscles of our patients: sternocleidomastoid, splenius capitis, upper trapezius, and temporalis muscles (Table 2). Interrater reliability regarding the diagnosis of myofascial trigger points was 80% showing that after a special training a high interrater reliability can be reached which will be consistent during the course of the visits.

A total of 9 patients were admitted for trigger point-specific physiotherapy of the pericranial and cervical muscles, in particular splenius capitis muscle and sternocleidomastoid muscle by our specially trained physiotherapist (J.S.). Intended participation could not be accomplished by 6 of the 15 families because of organizational reasons, especially because of the long distance to our clinic and the conflict between therapeutic sessions and school schedules. The treatment group consisted of 6 patients with episodic tension-type headache and 3 patients with chronic tension-type headache.

Our patients consistently showed a reduction in both headache frequency and intensity under this special therapy. After an average number of 6.5 therapeutic sessions, the headache frequency had been reduced from more than 3 days per week to 1 day per week (67.7% improvement). The intensity had nearly diminished to 1.67 on the visual analog scale compared to 6.5 visual analog scale before treatment (74.3% improvement). The headache duration also improved significantly from 6 h/d before therapy to 1.36 h/d after therapy (77.3% improvement; Table 3).

The first therapeutic effect could already be observed after 2 to 3 sessions. No side effects were noted during the physiotherapy and no patient discontinued study during the pilot phase.

Discussion

Myofascial trigger points were probably underestimated in the pathophysiology of headache syndromes in children. Recently, research findings by Fernández-de-las-Penas et al emphasized the clinical importance of the role of myofascial trigger points in adult patients with migraine as well as in adult patients with tension-type headache.^{7-14,20} Until now, the epidemiological data of myofascial trigger points in children with headache are still lacking, even though headache is one of the leading symptoms for pediatric consultation. There are only a small number of evidence-based studies on the medication used to treat headache syndromes in children. Additionally, there is still some reluctance to using too many medications in the treatment of headache syndromes in children, so patients and therapists are looking for further options.

In our headache outpatient clinic, we found that in the group of children with tension-type headache there was a subgroup of patients who showed tension-type headache together with active myofascial trigger points (30%). This is in accordance with the results reported by Fernández-de-las-Penas and colleagues, who showed that tension-type headache patients had active myofascial trigger points evoking the same referred pain and sensory characteristics as the habitual headache.⁸

Regarding this concept, it is conceivable that myofascial trigger points in pericranial and cervical muscles in patients with tension-type headache may also change the nociceptive input of trigeminal afferents by a central sensitization phenomenon.^{20,21} Recently, Fernández-de-las-Penas has proposed an updated pain model for tension-type headache. They hypothesized that myofascial trigger points would be the primary hyperalgesic zone. The sum of nociceptive stimuli from head and neck muscles—innervated by C1 to C3 or trigeminal nerve—would lead to a continuous afferent input to the nucleus caudalis of the trigeminal complex. This continuous input could result in a central sensitization to pain in chronic tension-type headache. According to this hypothesis, referred pain from myofascial trigger points itself would partly explain the pathophysiology of tension-type headache.¹³ The fact that central sensitization plays a role is also supported by the finding that the pain thresholds outside the trigeminal innervation are decreased.²²

The interrater reliability between our 2 investigators, who were blinded for each other's interpretation of the patient's musculoskeletal status, was within the range reported by Gerwin et al after a specialized training to have an equal level of diagnostic skills in both the investigators.¹⁸

In our small group of patients with tension-type headache and active myofascial trigger points, we experienced a good therapeutic response, namely a 68% reduction in

headache frequency by trigger point-specific physiotherapy by an experienced and trained physiotherapist. The exact action of such physiotherapy is not clear. A discussed mechanism is the dissolving of adhesions in the connective tissue by manual techniques which leads to an improvement in the blood circulation thereby reducing active myofascial trigger points. Assuming a pathophysiological role of active myofascial trigger points in tension-type headache, the reduced headache frequency could be partly explained by the reduced or diminished myofascial trigger points. This would result in a reduced nociceptive input to the caudal trigeminal nucleus and therefore less central sensitization. Another explanation would be that the physiotherapy changes the sensory inflow and in turn the central processing. Such a mechanism is also discussed by some authors in order to explain why dry needling can reduce the myofascial pain syndrome.

The acceptance of this therapy was very good throughout the study population, as it involved a short-time commitment consisting of 2 sessions per week for a month. Positive therapeutic effects could already be noticed within the first 2 weeks. Additionally, patients could be taught the release techniques for self-administering to maintain the achieved effect once the pilot study was completed.

Conclusion

With the findings of this first approach, it appears that myofascial trigger points may play an additional role in a subgroup of children with tension-type headache. In the treatment of these children, the trigger point-specific physiotherapy seems to be a therapeutic alternative as shown in our small group of patients in the pilot study.

Until now, the evidence-based data on therapeutic options for children with primary headaches are very rare. This leads to difficulties in offering them new therapeutic strategies. We therefore started a controlled prospective study in a larger number of children to evaluate this new therapeutic option for tension-type headache in children.

References

1. Kroner-Herwig B, Heinrich M, Morris L. Headache in German children and adolescents: a population-based epidemiological study. *Cephalalgia*. 2007;27:519-527.
2. Lewis D, Ashwal S, Dahl G, et al. Practice parameter: evaluation of children and adolescents with recurrent headaches: report of the Quality Standards Subcommittee of the American Academy of Neurology and the Practice Committee of the Child Neurology Society. *Neurology*. 2002;59:490-498.
3. Gerwin R. Headache. In: Ferguson L, Gerwin R, eds. *Clinical Mastery in the Treatment of Myofascial Pain*. Philadelphia, PA: Lippincott Williams & Wilkins; 2005:1-24.
4. Jensen R. Pathophysiological mechanism of tension-type headache: a review of epidemiological and experimental studies. *Cephalalgia*. 1999;19:602-621.
5. Simons DG. Myofascial trigger points: a need for understanding. *Arch Phys Med Rehabil*. 1981;62:97-99.
6. Simons DG, Travell JG, Simons LS. *Myofascial Pain and Dysfunction: The Trigger Point Manual*. Vol 1. 2nd ed. Baltimore, MD: William & Wilkins; 1999.
7. Fernández de las Penas C, Cuadrado ML, Gerwin RD, Pareja JA. Referred pain from the trochlear region in tension-type headache: a myofascial trigger point from the superior oblique muscle. *Headache*. 2005;45:731-737.
8. Fernández-de-las-Penas C, Alonso-Blanco C, Cuadrado ML, Gerwin RD, Pareja JA. Trigger points in the suboccipital muscles and forward head posture in tension-type headache. *Headache*. 2006;46:454-460.
9. Fernández-de-las-Penas C, Alonso-Blanco C, Cuadrado ML, Pareja JA. Myofascial trigger points in the suboccipital muscles in episodic tension-type headache. *Man Ther*. 2006;11:225-230.
10. Fernández-de-las-Penas C, Ge HY, Arendt-Nielsen L, Cuadrado ML, Pareja JA. Referred pain from trapezius muscle trigger points shares similar characteristics with chronic tension type headache. *Eur J Pain*. 2007;11:475-482.
11. Fernández-de-Las-Penas C, Alonso-Blanco C, Cuadrado ML, Gerwin RD, Pareja JA. Myofascial trigger points and their relationship to headache clinical parameters in chronic tension-type headache. *Headache*. 2006;46:1264-1272.
12. Fernández-de-Las-Penas C, Cuadrado ML, Pareja JA. Myofascial trigger points, neck mobility, and forward head posture in episodic tension-type headache. *Headache*. 2007;47: 662-672.
13. Fernández-de-las-Penas C, Cuadrado ML, Arendt-Nielsen L, Simons DG, Pareja JA. Myofascial trigger points and sensitization: an update pain model for tension-type headache. *Cephalalgia*. 2007;27:383-393.
14. Couppé C, Torelli P, Fuglsang-Frederiksen A, Andersen KV, Jensen R. Myofascial trigger points are very prevalent in patients with chronic tension-type headache: a double-blinded controlled study. *Clin J Pain*. 2007;23:23-27.
15. Alvarez DJ, Rockwell PG. Trigger points: diagnosis and management. *Am Fam Physician*. 2002;65:653-660.
16. Graff-Radford SB. Myofascial pain: diagnosis and management. *Curr Pain Headache Rep*. 2004;8:463-467.
17. HIS: Headache Classification Committee of the International Headache Society. Classification and diagnostic criteria for headache disorders, cranial neuralgias and facial pain. 1st ed. *Cephalalgia*. 1988;8:29-34.
18. Gerwin RD, Shannon S, Hong CZ, Hubbard D, Gevirtz R. Interrater reliability in myofascial trigger point examination. *Pain*. 1997;69:65-73.
19. Hong CZ. Treatment of myofascial pain syndrome. *Curr Pain Headache Rep*. 2006;10:345-349.
20. Fernández-de-Las-Penas C, Cuadrado ML, Pareja JA. Myofascial trigger points, neck mobility and forward head posture in unilateral migraine. *Cephalalgia*. 2006;26: 1061-1070.
21. Goadsby PJ. Migraine pathophysiology. *Headache*. 2005; 45(suppl 1):S14-S24.
22. Schmidt-Hansen PT, Svensson P, Bendtsen L, Graven-Nielsen T, Bach FW. Increased muscle pain sensitivity in patients with tension-type headache. *Pain*. 2007;129:113-121.