▪ Headache Medicine 2026, 17(3):281-291 ▪ p-ISSN 2178-7468, e-ISSN 2763-6178

Headache Medicine

▪ DOI: 10.48208/HeadacheMed.2026.37

Original

Tension-type headache treatment using local mechanical vibration targeting temporalis and occipitalis muscles—a non-invasive method: a feasibility study

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Edited by:
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Abstract

Introduction
Tension-type headaches (TTH) are the most common type of headache and are thought to be caused by stress in daily life. This study uses a non-invasive vibration technique to target the precranial muscles' myofascial trigger points, which can reduce pain.

Methods
Thirty university students aged 19–24 with TTH participated in a feasibility study and were distributed evenly into two groups. The vibrational group (n=15) received local mechanical vibration therapy, while the sham group (n=15) received a placebo treatment. The tension headache band with four local vibrating mini motor discs (SKU 850917; New York, USA) rotates at 12000 rotations per minute with a frequency of 150 Hz was used. The pain level was detected in the baseline, immediately, and after 2 hours of vibration intervention using the numerical pain rating scale (NPRS).

Discussion
The Mann-Whitney U-test revealed a statistically significant reduction in pain levels both immediately (p=0.001) and two hours later (p=0.001) in favor of the vibrational group. The within-group comparisons revealed a statistically significant difference across all time points for the vibrational group only. Specifically, the vibrational group (n=15) demonstrated highly significant reduction when comparing baseline to immediate measurements (p=0.001), baseline to 2 hours post-intervention (p=0.001), and immediate to 2 hours post-intervention (p=0.004). The optimal time for TTH alleviation was between 47-180 sec.

Conclusion
Patients with TTH who received vibration therapy employing 150 Hz frequency ranges experienced improvements in their NPRS. Mechanical vibration therapy may therefore be a useful strategy for relieving tension headache discomfort..

Keywords:
Tension- type headache
Mechanical vibration
Temporalis
Occipitalis

Received: August 19, 2026
Revised: October 14, 2026
Accepted: October 22, 2026

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Introduction

Tension-type headache (TTH) is a common reaction to stress in daily life. The most common neurological condition in the world, TTH, is defined by bilateral, recurrent, mild to moderately intense headaches that feel tight or pressing and are not aggravated by normal physical activity (1). TTH is the most prevalent type of headache in adults and teenagers (2,3). The etiology and mechanism of TTH remain unclear, despite their substantial public health impact (4).

Muscle dysfunction, particularly myofascial trigger points, is a significant element contributing to TTH. A local twitch response, or the contraction of certain fibers rather than the entire muscle, frequently accompanies it (5). Although the exact source of trigger points is unknown, the most likely theory, the Integrated Trigger Point Hypothesis (ITPH), contends that various events influence the sarcomeres and motor endplates, causing them to become hyperactive. Pathological alterations at the cellular level result from this, including decreased oxygen delivery, unintentionally shortened muscle fibers, aberrant biochemical composition with higher levels of serotonin, noradrenaline, acetylcholine, and a lower pH (6).

It has been hypothesized that pain from muscle trigger points (TrPs) in the head, neck, and shoulder muscles may be the source of tension headache-related pain to some degree (7). Muscle and myofascial TrPs are typically described as the hypersensitive areas in a skeletal muscle's taut band that, when examined, transferred distant pain (8). Active TrPs in TTH are those that replicate pain sensations that the patient experiences during headache episodes. Indeed, several investigations revealed that the pain evoked by active TrPs in occipital and temporalis muscles (8,9).

Research has shown that stimulating specific points in the head can help reduce muscular and neurological pain. For example, it was found that stimulating the occipital muscles could decrease the activity of neural receptors associated with TTH (10). Additionally, non-pharmacological interventions, such as localized pressure or electrical stimulation, may be effective in alleviating symptoms in patients suffering from chronic TTH (11).

According to a study, children with TH may benefit from treatment targeting TrPs, which would lessen the frequency, severity, and duration of their headaches but this study didn't include the adult or adolescent subjects (12). Both traditional and non-traditional approaches are used in TH treatment. Oral medicine is used to treat headaches. Pain can be lessened with medication. Aspirin, ibuprofen, triptans, ergotamine, and other painkillers are used to lessen headaches. However, using these medications in excess might have negative effects like toxicity, ulcers, paresthesia, kidney and liver dysfunction, etc (13).

Manual therapy is among the most often utilized unconventional techniques (14). In addition, unconventional treatments for TH include dry needling, ischemic compression, positional relaxation techniques, and massage procedures aimed at deactivating trigger points (4). Vibration has the potential to reduce pain, alter blood vessel elasticity, enhance circulation blood flow, boost muscle strength and flexibility, and enhance mental well-being. Vibration treatment first appeared in the 19th century. The vibration reduces discomfort and acts as a sensory diversion. The body feels as though it is being massaged by vibration (13). However, there hasn't been a literature that specifically addresses the application of local mechanical vibration for myofascial trigger point therapy in the management of TH. Determining the effectiveness of the local mechanical vibration therapy approach in relieving TH is the primary goal of the current study. A secondary objective was to evaluate the optimal time point for tension-type headache alleviation, as well as to investigate potential sex-related differences regarding the use of the tension headache band. The null hypothesis of the current study states that there is no effect of local mechanical vibration using the tension headache band in relieving the TTH among University students.

Methods

Study design

A feasibility study was conducted including two intervention groups; a vibrational group (n=15) that took a local mechanical vibration treatment and a sham group (n=15) that had a placebo treatment for the tension headache though using the tension headache band.

Participants

Thirty university students of both sexes (21 females and 9 males) between the ages of 19 and 24 participated in the study after providing their informed consent. The sample size of thirty subjects was detected using G- power software version 3.1.9.4 with medium effect size 0.25 as a priori as it represents a conservative, medium treatment effect according to Cohen's established benchmarks for operationalizing variance in behavioral sciences. This benchmark was adopted because no prior literature has explored this specific interaction, making a default medium effect assumption appropriate, alpha error probability 0.05, and actual power of 0.95 a priori to minimize type II errors, given the high clinical significance of the primary outcome but for increasing the study accuracy 35 subjects were included in the study to concern the 15 % dropout rate of participants as shown the flow charts in the Figure 1 below.

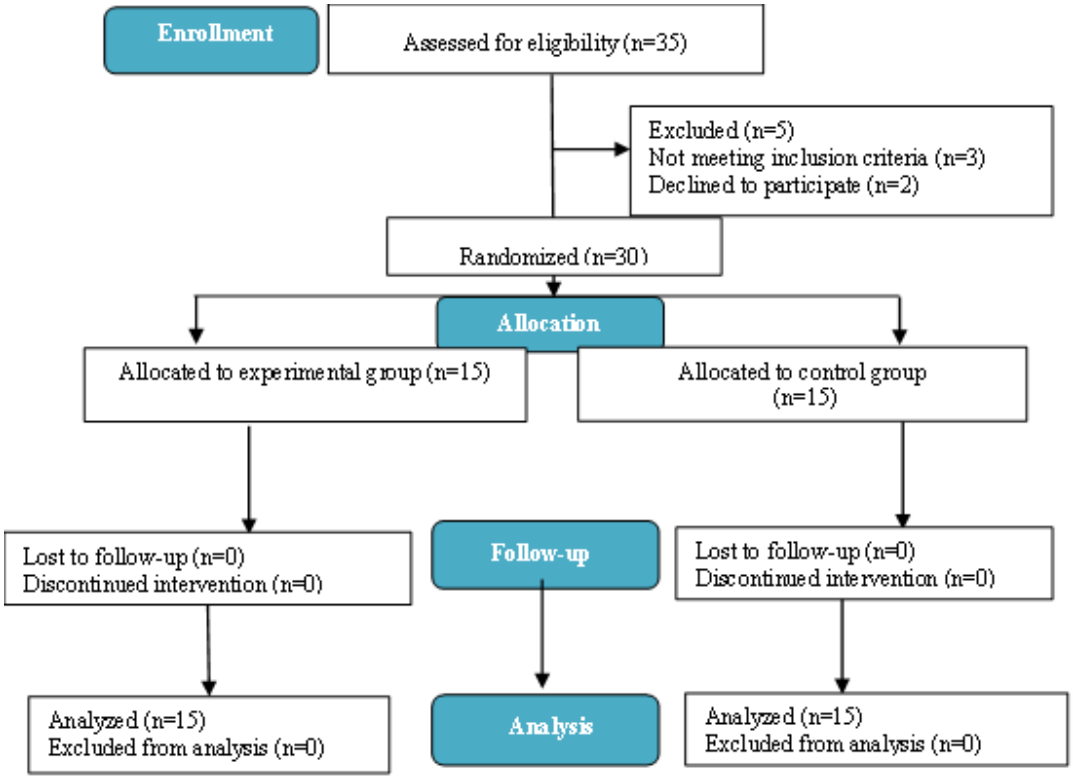

Figure 1. Flow chart diagram.

The participants were mostly recruited by announcements and media coverage to potentially eligible participants were recognized. All participants were invited for tension headache screening. Participants had mild to moderate tension headaches with no history of musculoskeletal or neurological problems in the head region. In addition, they had no visual or auditory problems. They didn't suffer from hereditary disorders, sphenoid sinusitis, or temporomandibular disorders. They only experienced infrequent episodic (<1 day/month) or frequent episodic (1–14 days/month) tension headaches; they did not have chronic tension headaches (≥15 days/month for >3 months). Moreover, they are free from cervical pathology or any brain tumor which were detected by neurological examination. The subject confirmed that no analgesics, such as aspirin or other pain-relieving medications, were ingested within 24 hours prior to testing. Each participant reported exercising at a low to moderate level. Individuals presenting symptoms overlapping with migraine (e.g., severe pulsating pain, concurrent photo- and phonophobia, or any grade of nausea/vomiting) were excluded from the study. A basic random sample technique was used to distribute the thirty participants into 2 groups (Vibrational Group=15 and Sham group=15).

An independent researcher who was not involved in patient recruiting, intervention administration, or outcome evaluation created a computer-generated allocation list with a 1:1 ratio for random sequence creation. Sequentially numbered, opaque, sealed envelopes were used to assure allocation concealment; these envelopes were opened only after participant eligibility was verified and written informed permission was obtained. A research coordinator supervised group assignment, and throughout the trial period, outcome assessors and data analyst were blind to group assignments. This rigorous procedure improved the trial's internal validity while reducing selection and detection bias. Also, to reduce performance bias and guarantee the neutrality of the outcome measures, participant blinding was applied. To avoid any cross-communication, each participant conducted identical evaluation procedures in different time periods, wore identical vibration band, and received instruction sessions that were structurally equivalent. This made sure that self-reported compliance or performance during the evaluation stages were unaffected by expectations about the intervention.

Outcome measures

The primary outcome of this study was the measurement of pain intensity, evaluated by comparing baseline (pre-intervention) pain scores to post-intervention pain scores immediately and after 2 hours of intervention. Pain level was measured subjectively using a standard 10-point Numeric Rating Scale (NRS). The secondary

outcomes were the detection of optimal time point for tension-type headache alleviation and a gender-based subgroup analysis designed to determine if treatment efficacy varied by biological sex. All pain metrics were assessed at baseline, immediately, and 2 hours following the completion of the intervention protocol.

Instrumentation and tools

The tension headache band with four local vibrating mini motor disc (SKU 850917; New York, USA) that are connected to this band from both sides of the head (at the center of the temporalis muscle) and the posterior aspect of the head (at the center of the occipitalis muscles) which are considered the main locations of the trigger points of tension-type headache (8,9) as shown in the Figure 2 and 3. All participant head sizes can be accommodated with the elastic and adjustable band. It is secure and comfortable for the participants' heads. The four local vibrating mini motor discs connected to the band and isolated from direct contact with the participant's head with cotton clothes. Their dimensions are 10 mm diameter, 2.7 mm thick and their weight is 0.9 grams. They were working at 150 Hz with power given to the device is 5V which is considered safe and effective for relieving headaches (13). The vibrating motor rotates 12000 rotations per minute. The investigators used the numerical pain rating scale to assess the degree of headaches before and after the treatment intervention. The NPRS uses an 11-point numerical continuum to measure the degree of pain. Participants are asked to rate their level of discomfort on a scale of 0 (no pain) to 10 (the most severe pain they can imagine) (15).

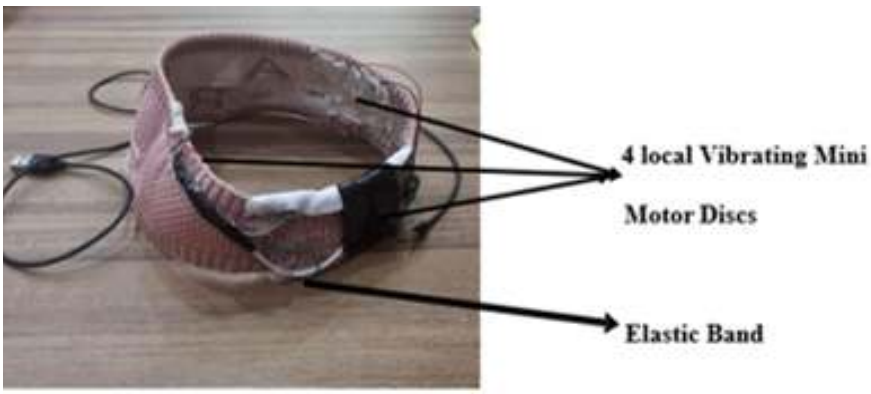

Figure 2. Tension headache band.

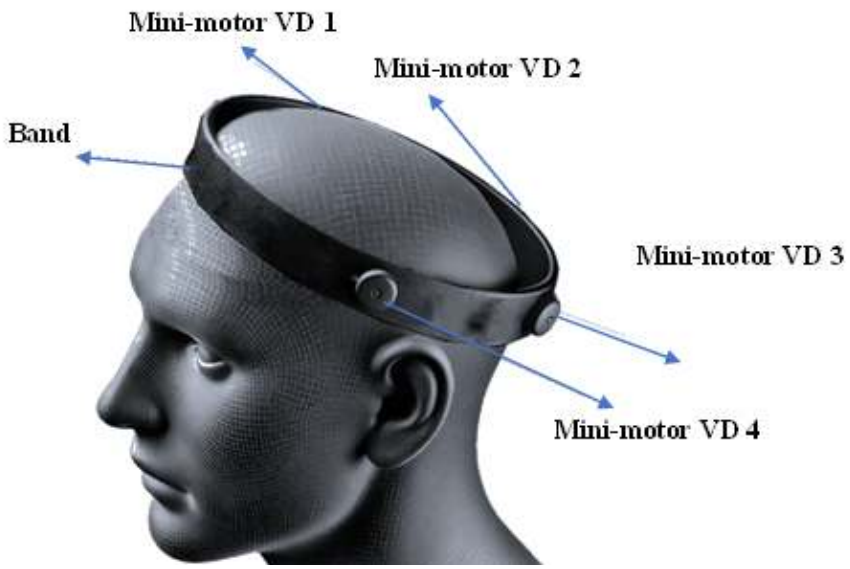

Figure 3. The location of local vibrating mini motor discs inside the tension headache band.

Procedure

The study conducted in Physical Therapy Laboratory at the College of Applied Medical Sciences, Jouf University, Saudi Arabia. The study was approved by the permanent committee of the ethics of scientific research at Jouf University (IRB No. 7523) in April 2025 according to the Declaration of Helsinki and registered with trial registration No. PACTR202507738242903 in July 2025. Prior to participation, all subjects gave their informed consent. Furthermore, separate written informed consent was obtained specifically for the publication of participant photographs. This permission was granted under the strict condition that all faces are completely masked to protect anonymity. Anthropometric and demographic data were collected, and all sensitive information was kept private.

All participants were screened for tension-type headaches using a structured clinical interview followed strictly the International Classification of Headache Disorders, 3rd edition (ICHD-3) (16) criteria as follows; 1) Attack duration: headache episodes lasting between 30 minutes and 7 days. 2) Pain characteristics: at least two of the following four features: (a) bilateral location; (b) pressing or tightening (non-pulsating) quality; (c) mild or moderate intensity; and (d) no aggravation caused by routine physical activity. 3) Associated symptoms: absence of both nausea and vomiting, and the presence of no more than one sensory sensitivity (either photophobia or phonophobia, but not both).

The clinical screening and diagnostic interviews were completed by two independent experienced investigators to achieve excellent inter-rater reliability. Discrepancies in classification were resolved through third senior specialist helped resolve the discrepancies in the classification.

The numerical pain rating scale (NPRS) was used to detect the intensity of headache pain. The participants in the study were distributed randomly to a treatment group (the application of the tension headache band with the vibration motor switched on) and a sham group (the application of the tension headache band with the vibration motor switched off). All participants detected their pain level using the NPRS before, immediately, and after 2 hours of using the tension headache band. A quiet private room was available for screening, intervention, and evaluation procedures.

In the treatment group, the intervention began by asking the subject to sit quietly and take a deep breath during the intervention. Although deep breathing plays a role in relieving the tension-type headache, any extraneous effect of deep breathing can be controlled by having deep breathing (vibrational and sham groups). The tension headache band was placed around the participant's head with the centralization of the tiny vibration discs on the bilateral temporalis and occipitalis muscles to stimulate the myofascial trigger points on these muscles for relieving the headache as shown in Figure 4.



Figure 4. The placement of tension headache band on the participants' head.

The myofascial trigger points in bilateral temporalis muscles were detected by pressing gently with examiner's fingers to feel for tight bands within muscles, hard knots, and areas that send pain to other parts of the head or face when pressed. The examiner felt the side of participant's head above the ear and near the temple. Each participant clenched the teeth to make the muscle hard and easy to feel, then the examiner pressed firmly with the index and middle finger along the side of the head and noticed the spot that sent pain to the teeth, upper jaw, or the area above the eye. The same procedure was repeated to detect the myofascial trigger points in the occipitalis muscle where the examiner felt the back of the participant's head just above neck bones moving scalp slightly up and down to find where the muscle moves then pressed gently with your fingertips to detect the spot that cause a deep ache at the back of the head or a feeling like a tight band around the head (17).

The time of application depends on the patient's tolerance and the time taken to reduce the pain of tension- type headaches. The time of application was detected from the beginning of the treatment (the vibration motor switched on) till the feedback was taken from the participant by switching off the vibration stimulation to detect the meantime of reliving the tension-type headache among the participants using the tension headache band.

A standard, horizontal 11-point Numeric Pain Rating Scale (NPRS) was utilized to measure subjective tension-type headache pain intensity. The scale consisted of a straight line segmented from 0 to 10, where the number 0 was anchored with the verbal descriptor "No pain" on the far left, and the number 10 was anchored with "Worst imaginable pain" on the far right.

During evaluation, the NPRS sheet was placed directly in front of each participant in a well-lit, quiet environment to minimize external disruptions. The assessor provided consistent verbal instructions, asking the participant to look thoroughly at the scale and express their current headache sensation. Participants were instructed to select the single whole integer that best represented their pain level.

To prevent bias, the evaluator did not suggest any numbers or interpret the participant's expressions. Once the participant verbally indicated or pointed to their chosen integer, the score was immediately documented by the researcher on a data collection sheet. This exact protocol was repeated at baseline (pre-intervention), immediately, and after 2 hours following the completion of the final treatment session (post-intervention).

The same procedure was repeated for the sham group but by switching off the vibration motors of the tension headache band. All participants were informed during recruitment that they would test different active settings or modes of the device (They were informed that a mechanical vibration can be applied so lightly that it cannot be consciously sensed), rather than being told one mode was a "placebo" or "switched off" condition. The evaluation of pain associated with tension-type headache was detected at baseline, immediately, and 2 hours after the application of the tension-type headache band using the NPRS. The researchers asked the participants not to take any analgesic drugs for 2 hours post-intervention. To ensure accurate data collection at home, the examiner provided each participant with a physical sample of the NPRS sheet to take with them upon departure. The examiner contacted the participants by telephone after 2 hours of application of a tension headache band to verbally report their current pain intensity score utilizing their take-home NPRS reference sheet.

Data analysis

The data exploration was conducted to detect any outliers and to deal with them statistically. The tests of normality (Shapiro-Wilk test) and homogeneity (Levene's test) were conducted. Descriptive statistics were applied to calculate the Mean and SD of all variables of interest. Independent sample t-test was used to compare the demographic data between both groups. The change in the pain level of tension-type headache from baseline level to post-test (immediately after intervention and after 2 hours of intervention) was compared to the Mann-Whitney U-test between both groups in different conditions. In addition, Mann-Whitney U-test was used to compare the three conditions for both sexes in both groups which is robust against unequal and small sample sizes. The Friedman test was utilized to compare variables of interest (headache pain conditions) within groups.

Results

Data exploration and descriptive statistics

Shapiro-Wilk test showed no statistically significant differences in the demographic data (age, weight, height, and BMI) ($p \geq 0.05$) which indicated the normally distributed data, while showed statistically significant differences in the variables of interest (pain level of tension-type headache in different conditions) ($p < 0.05$) which indicated no normally distributed. The descriptive statistics of demographic data were calculated as shown in Table1. In addition, the independent t-test showed no statistically significant differences in demographic data between both groups as shown in Table 1.

Table 1. Independent t-test compared the demographic data between both groups

Variables	Sham group (n=15)			Vibrational group (n=15)			p-value	t-value
	Minimum	Maximum	Mean ± SD	Minimum	Maximum	Mean ± SD		
Age, years	20	24	22±1.1	19	23	21.1±1.4	0.053	2.018
Height, cm	150	183	164.1±9.4	147	148	159.9±10	0.253	1.167
Mass, kg	37	98	70±18	49	84	63.5±10.8	0.245	1.192
BMI, kg/cm^2	16.4	31.1	25.2±4.37	17.1	32.9	25±4.6	0.882	0.150
Time of pain suppression after application of tension headache band, sec.	-	-	-	47	180	95±38.7	-	-

The Mann-Whitney U-test between group comparison and Friedman test within group comparison

Mann-Whitney U-test showed statistically significant reduction in the pain levels of tension-type headache in the two conditions (immediately after intervention and after 2 hours of intervention) of vibrational group in comparison to the sham group p-value <0.05 as shown in Table 2. On the other hand, the Mann-Whitney U-test showed no statistically significant differences in the pain levels of tension-type headache among the three conditions between male and female as shown in Table 3.

On the other hand, Friedman test for within group comparison showed statistically significant reduction in the pain levels of tension-type headache among the three conditions (baseline, immediately after intervention and after 2 hours of intervention) in the vibrational group, while there was no statistically significant reduction in the pain levels of tension-type headache among the three conditions in the sham group.

Table 2. Mann-Whitney U-test and Friedman test for comparing the pain level of tension headache in the three conditions between and within groups

Pain Level of Tension Headache	Sham Group (n=15) Median (IQR) [Min–Max]	Vibrational Group (n=15) Median (IQR) [Min–Max]	Exact Sig. (2- tail)
Baseline	4.0 (4.0–5.0) [3–6]	5.0 (4.0–6.0) [4–7]	0.285
Immediate	4.0 (3.0–5.0) [3–6]	1.0 (0.0–3.0) [0–5]	0.001*
After 2 hours	4.0 (3.0–6.0) [0–7]	0.0 (0.0–0.0) [0–1]	0.001*
Within groups comparison Friedman test			
Sham Group (n= 15)	p-value	Vibrational Group (n= 15)	p-value
Baseline vs. Immediate	0.072	Baseline vs. Immediate	0.001*
Baseline vs. after 2 hours	0.344	Baseline vs. after 2 hours	0.001*
Immediate vs. after 2 hours	0.754	Immediate vs. after 2 hours	0.004*

*Significant level at p-value<0.05. Abbreviation: IQR; interquartile range.

Table 3. Mann-Whitney U-test comparing the pain level of tension headache in the three conditions for both sexes

Pain Level of Tension Headache	Sham Group (n=15)			Vibrational Group (n=15)		
	Male (n=4) Median (IQR) [Min–Max]	Female (n=11) Median (IQR) [Min–Max]	Exact Sig. (2- tail)	Male (n=5) Median (IQR) Min–Max]	Female (10) Median (IQR) [Min–Max]	Exact Sig. (2- tail)
Baseline	5.5 (3.5-6) [3-6]	4 (4-5) [4-6]	0.248	5 (4.5-6.5) [4-7]	4 (4-6.3) [4-7]	0.417
Immediate	5 (3.5-5.8) [3-6]	3.5 (3-4) [3-5]	0.149	1 (.0-2) [0.0-3]	2 (0-3) [0-5]	0.373
After 2 hours	6 (3.8-6.8) [3-7]	4 (2-4) [0-6]	0.063	.0 (.0-.0) [.0-.0]	0 (0-.25) [.0-1]	0.524

*Significant level at p-value<0.05. Abbreviation: IQR; interquartile range

Discussion

To the limit of our knowledge, this is a feasibility study examines how vibration therapy affects the pericranial muscles (temporalis and occipitals) to relieve tension-type headaches. The results of the current study showed that there was no statistically significant difference in the baseline measurement between both groups (vibrational and sham groups). On the other hand, there was a significant reduction in the pain of tension-type headache after the application of mechanical vibration through the local Vibrating Mini Motor Disc that embedded in the tension headache band in the vibrational group in comparison to the sham group in the immediate and 2 hours after application effect. In addition, the pain reduction was statistically significant between the baseline measurement and 2 hours after the application of tension headache band and between the immediate effect of application and after 2 hours of application in the vibrational group only which indicated the effectiveness of tension headache band to relive the headache in effective way without any side effect on the participants. On the other hand, there was no statistically significant difference between male and female immediately after the application and after 2 hours of the application of tension headache band in both the vibrational and sham groups. The minimum time detected for reliving the headache according to the participants' response was 47 secs and the maximum time for reliving the headache is 180 secs (3 minutes) with the mean 95 sec in the vibrational group.

This non-invasive headache treatment is easy to use and drug-free. The device is useful for treating tension-type headaches. Vibration is used to alleviate the pain (13). There are no adverse effects from this device. This technology is inexpensive and simple to use without the assistance of physicians. Anyone can use this equipment to treat headaches without facing sex differences. To prevent any unwanted skin discomfort, the vibration motor must be fitted into a soft flexible band. The frequency and severity of headaches are associated with pericranial myofascial tissue tenderness and several studies demonstrate increased pericranial muscle tension in patients (18–20). Therefore, the pathophysiology of tension-type headache may be linked to myofascial structures, but the majority of myofacial trigger point (MTrP) intervention studies are effective in alleviating headaches; however, they do not examine the impact of mechanical vibration on MTrPs (21–24).

Our study focused on the pericranial muscles trigger points which are the temporalis and occipitals muscles in reliving the pain by using the local mechanical vibration. Duenas et al.(25) found that local vibration therapy was effective in reducing Neck Disability Index scores and raising pressure pain threshold values in patients with chronic non-specific neck pain by targeting the myofacial trigger point in the upper trapezius and levator scapulae. The improvement in the NPRS seen in this trial is similar to the improvements seen in patients with TTH treated with other conservative techniques that include vibration, including massage, manual therapy and acupuncture, or cupping (26–29). This could imply that vibration techniques, irrespective of the particular modality, could be useful in treating tension-type headache patients' discomfort and disability. These fascinating novel therapeutic options should be investigated in larger studies involving populations with tension-type headaches.

The improvement of NPRS in vibration group in comparison to the sham group after 2 hours of application of vibration therapy my return to a specific factor such as the cumulative effect of vibration in the continues relaxation of the muscle and reliving the tension from the MTrPs, it could also be caused by a non-specific factor such as the patient expectation or placebo. Controlling all potential confounding variables is extremely challenging in clinical research after these "non-specific" factors are eliminated and any intervention as a stand-alone treatment has uncertain efficacy (30–32).

Understanding how a human cell reacts to external physical stimuli is key to understanding why vibration can induce local pain relief. Even though this study did not precisely address the fundamental processes of pain alleviation, some debate is still necessary. According to two suggested modes of action for treatments in MTrPs, vibration Therapy (VT) may have had its impact locally by regulating sarcomere length or boosting blood flow (33,34). Furthermore, it's possible that the mechanical stimulation brought on by the application of VT stimulated Aβ fibers, which in turn caused a segmental inhibition at the spinal cord level through the gate control mechanism. The gate control hypothesis suggests that vibration has a significant effect on afferent discharges from muscle spindles and fast-adapting mechanoreceptors, and as a result, relieves pain (35). Moreover, it is widely acknowledged that mechanotransduction the process by which a mechanical force is transformed into a cellular and molecular response, plays a role in the mechanism of action of vibration treatment (36). Because muscle tissue modulates load-induced pathways, it is extremely responsive to changes in functional demands (37).

It is well established that the pericranial muscles' MTrPs may be crucial in the development of TTH (38). Inactivating MTrPs is the foundation for treating myofascial pain. Dry needling and ischemia compression are the most popular conservative treatments for this aim (39,40). But as far as we are aware, vibration therapy has never been used as a substitute for MTrPs in treatment. So, our study directly investigates the effect of local vibration therapy on MTrPs in relieving the tension-type headache. However, future studies need to confirm the results a further investigate the local effect of vibration in reliving the tension-type headache. The finding of a novel, non-invasive treatment for TTH (the Tension Headache Band) is what makes this study significant. This type of therapy will take place of pharmaceuticals and lessen their negative effects on people. To determine the dosage needed by each patient based on input

obtained from the myofascial trigger points, the tension headache band must be developed by integrating it with artificial intelligence.

It is important to recognize that our study has several limitations. First, the sample size may have some limitations on the results that were obtained. The sample size impact is moderate, even though the number of patients permitted the discovery of substantial differences between vibrational and sham groups as well as within the vibrational group throughout the therapy. Our findings may not be as broadly applicable to the broader population due to the small sample size. The amplitude of the effect could be strengthened by a larger sample size, which also increases variability. This would allow for the comparison of results between various muscles (for example frontalis muscle) or subject characteristics, such age or gender. Therefore, greater research involving more patients is advised. Second, only specific vibration frequency was investigated, so further studies were needed to investigate the effect of different frequency and amplitude of mechanical vibration in reliving the tension-type headache. In addition, certain age range was included in this study which affects the generalization of study results. Our results cannot be generalized to other head regions because this study only examined the temporalis and occipitals muscles. Lastly, although the investigators responsible for data collection and statistical analysis remained fully blinded to the group allocations, blinding success was not formally assessed via a post-intervention questionnaire. Future research ought to examine the impact of VT on different pericranial muscles. To ascertain the long-term impacts of VT, more investigation is also required.

Conclusion

According to this study, patients with TTH who received vibration therapy employing 150 Hz frequency ranges experienced improvements in their NPRS. To ascertain the actual effectiveness of vibration therapy, further extensive population studies are required. Self-applied vibration therapy may therefore be a useful strategy for relieving tension-type headache discomfort, and it might be incorporated into an all-encompassing physical therapy regimen.

References

1. Ashina S, Mitsikostas DD, Lee MJ, Yamani N, Wang S-J, Messina R, et al. Tension-type headache. Nat Rev Dis Primers 2021;7. Doi:10.1038/s41572-021-00257-2.
2. Andlin-Sobocki P, Jönsson B, Wittchen H, Olesen J. Cost of disorders of the brain in Europe. Eur J Neurol 2005;12:1–27. Doi:10.1111/j.1468-1331.2005.01202.x.
3. Unalp A, Dirik E, Kurul S. Prevalence and clinical findings of migraine and tension-type headache in adolescents. Pediatrics International 2007;49:943–9. Doi:10.1111/j.1442-200X.2007.02484.x.
4. Dolina A, Baszczowski M, Wilkowicz W, Zieliński G, Szkutnik J, Gawda P. Trigger Point Therapy Techniques as an Effective Unconventional Method of Treating Tension Headaches: A Systematic Review. Healthcare 2024;12. Doi:10.3390/healthcare12181868.
5. Simons D, Travell J, Simons L. Travell & Simons' Myofascial Pain and Dysfunction: The Trigger Point Manual: Volume 1: Upper Half of Body. vol. 1. Lippincott williams & wilkins; 1999.
6. Bron C, Dommerholt JD. Etiology of Myofascial Trigger Points. Curr Pain Headache Rep 2012;16:439–44. Doi:10.1007/s11916-012-0289-4.
7. Fernández-de-las-Peñas C, Fernández-Mayoralas DM, Ortega-Santiago R, Ambite-Quesada S, Palacios-Ceña D, Pareja JA. Referred pain from myofascial trigger points in head and neck–shoulder muscles reproduces head pain features in children with chronic tension type headache. J Headache Pain 2011;12:35–43. Doi:10.1007/s10194-011-0316-6.
8. Fernández-de-las-Peñas 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: The Journal of Head and Face Pain 2006;46:454–60. Doi:10.1111/j.1526-4610.2006.00288.x.
9. Fernández-de-las-Peñas C, Ge H-Y, Arendt-Nielsen L, Cuadrado ML, Pareja JA. The Local and Referred Pain From Myofascial Trigger Points in the Temporalis Muscle Contributes to Pain Profile in Chronic Tension-type Headache. Clin J Pain 2007;23:786–92. Doi:10.1097/AJP.0b013e318153496a.
10. Mense S, Gerwin. RD, editors. Muscle Pain: Understanding the Mechanisms. Springer; 2010.
11. Licina E, Radojicic A, Jeremic M, Tomic A, Mijajlovic M. Non-Pharmacological Treatment of Primary Headaches—A Focused Review. Brain Sci 2023;13. Doi:10.3390/brainsci13101432.
12. von Stülpnagel C, Reilich P, Straube A, Schäfer J, Blaschek A, Lee S-H, et al. Myofascial Trigger Points in Children With Tension-Type Headache: A New Diagnostic and Therapeutic Option. J Child Neurol 2009;24:406–9. Doi:10.1177/0883073808324540.
13. Elliot CJ, Anitha S, Nithya TS, Sandhiya M, Manisha A. Non Invasive Treatment to Relieve the Pain due to Headaches & Sinus using Vibration on Acupressure Points. Int J Eng Adv Technol 2019;9:585–8. Doi:10.35940/ijeat.A1129.1291S419.
14. Espí-López GV, Arnal-Gómez A, Arbós-Berenguer T, López González ÁA, Vicente-Herrero T. Effectiveness of

Physical Therapy in Patients with Tension-type Headache: Literature Review. Journal of the Japanese Physical Therapy Association 2014;17:31–8. Doi:10.1298/jjpta.Vol17_005.
15. Al-Khazali HM, Al-Sayegh Z, Younis S, Christensen RH, Ashina M, Schytz HW, et al. Systematic review and meta-analysis of Neck Disability Index and Numeric Pain Rating Scale in patients with migraine and tension-type headache. Cephalalgia 2024;44. Doi:10.1177/03331024241274266.
16. Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. Cephalalgia 2018;38:1–211. Doi:10.1177/0333102417738202.
17. Borg-Stein J, Simons D. Myofascial pain. Arch Phys Med Rehabil 2002;83:S40–7.
18. Sakai F, Ebihara S, Akiyama M, Horikawa M. Pericranial muscle hardness in tension-type headache. Brain 1995;118:523–31. Doi:10.1093/brain/118.2.523.
19. Ashina M, Bendtsen L, Jensen R, Sakai F, Olesen J. Muscle hardness in patients with chronic tension-type headache: relation to actual headache state. Pain 1999;79:201–5. Doi:10.1016/S0304-3959(98)00167-5.
20. Lipchik G, Holroyd K, O'donnell F, Cordingley G, Waller S, Labus J, et al. Exteroceptive Suppression Periods and Pericranial Muscle Tenderness in Chronic Tension-Type Headache: Effects of Psychopathology, Chronicity and Disability. Cephalalgia 2000;20:638–46. Doi:10.1111/j.1468-2982.2000.00105.x.
21. Gandolfi M, Geroin C, Valè N, Marchioretto F, Turrina A, Dimitrova E, et al. Does myofascial and trigger point treatment reduce pain and analgesic intake in patients undergoing onabotulinumtoxinA injection due to chronic intractable migraine? Eur J Phys Rehabil Med 2018;54. Doi:10.23736/S1973-9087.17.04568-3.
22. Giamberardino MA, Tafuri E, Savini A, Fabrizio A, Affaitati G, Lerza R, et al. Contribution of Myofascial Trigger Points to Migraine Symptoms. J Pain 2007;8:869–78. Doi:10.1016/j.jpain.2007.06.002.
23. Ranoux D, Martiné G, Espagne-Dubreuilh G, Amilhaud-Bordier M, Caire F, Magy L. OnabotulinumtoxinA injections in chronic migraine, targeted to sites of pericranial myofascial pain: an observational, open label, real-life cohort study. J Headache Pain 2017;18. Doi:10.1186/s10194-017-0781-7.
24. Sollmann N, Trepte-Freisleder F, Albers L, Jung NH, Mall V, Meyer B, et al. Magnetic stimulation of the upper trapezius muscles in patients with migraine – A pilot study. European Journal of Paediatric Neurology 2016;20:888–97. Doi:10.1016/j.ejpn.2016.07.022.
25. Dueñas L, Zamora T, Lluch E, Artacho-Ramírez MA, Mayoral O, Balasch S, et al. The effect of vibration therapy on neck myofascial trigger points: A randomized controlled pilot study. Clinical Biomechanics 2020;78. Doi:10.1016/j.clinbiomech.2020.105071.
26. Turkistani A, Shah A, Jose AM, Melo JP, Luenam K, Ananias P, et al. Effectiveness of Manual Therapy and Acupuncture in Tension-Type Headache: A Systematic Review. Cureus 2021. Doi:10.7759/cureus.17601.
27. Apriza A, Shafie Z, Widada W, Bakar NAA, Abdullah N. Reduce Headache Levels with Cupping Therapy Methods in Hypertensive Patients. Conference STIKes Panca Bhakti (IHCPB) , 2023.
28. Imron VTB, Zalika AN, Alpiah DN. Effectiveness of Massage on Tension Type Headache Pain In Ages 25-50 Years. International Journal of Social Research 2024;2:227–37. Doi:10.59888/insight.v2i5.41.
29. Sharifi-Razavi A, Karimi N, Tabarestani M. Efficacy of trigger points self-massage in chronic tension-type headache: an unmasked, randomized, non-inferiority trial. Neurol Asia 2021;26:323–31.
30. Bialosky JE, Beneciuk JM, Bishop MD, Coronado RA, Penza CW, Simon CB, et al. Unraveling the Mechanisms of Manual Therapy: Modeling an Approach. Journal of Orthopaedic & Sports Physical Therapy 2018;48:8–18. Doi:10.2519/jospt.2018.7476.
31. Bishop MD, Mintken P, Bialosky JE, Cleland JA. Patient Expectations of Benefit From Interventions for Neck Pain and Resulting Influence on Outcomes. Journal of Orthopaedic & Sports Physical Therapy 2013;43:457–65. Doi:10.2519/jospt.2013.4492.
32. Mintken PE, Rodeghero J, Cleland JA. Manual therapists – Have you lost that loving feeling?! Journal of Manual & Manipulative Therapy 2018;26:53–4. Doi:10.1080/10669817.2018.1447185.
33. Cagnie B, Dewitte V, Barbe T, Timmermans F, Delrue N, Meeus M. Physiologic Effects of Dry Needling. Curr Pain Headache Rep 2013;17. Doi:10.1007/s11916-013-0348-5.
34. Armstrong WJ, Grinnell DC, Warren GS. The Acute Effect of Whole-Body Vibration on the Vertical Jump Height. J Strength Cond Res 2010;24:2835–9. Doi:10.1519/JSC.0b013e3181e271cc.
35. Melzack R, Wall PD. Pain Mechanisms: A New Theory. Science 1965;150:971–9. Doi:10.1126/science.150.3699.971.
36. LaGier AJ, Elbe A, Thamke A, Anderson P. Vibration, a treatment for migraine, linked to calpain driven changes in actin cytoskeleton. PLoS One 2022;17. Doi:10.1371/journal.pone.0262058.
37. Khan KM, Scott A. Mechanotherapy: how physical therapists' prescription of exercise promotes tissue repair. Br J Sports Med 2009;43:247–52. Doi:10.1136/bjsm.2008.054239.
38. Nurul K N, Rakhmawati E. D, Maulana R, Musadir N, Sofia S. The Relationship of Myofascial Trigger Points (MTrPs) Pain to Headache: Type, Location, and Intensity of Headache.

KESANS : International Journal of Health and Science 2022;1:625–48. Doi:10.54543/kesans.v1i6.66.
39. Giamberardino MA, Affaitati G, Fabrizio A, Costantini R. Myofascial pain syndromes and their evaluation. Best Pract Res Clin Rheumatol 2011;25:185–98. Doi:10.1016/j.berh.2011.01.002.
40. Benito-de-Pedro M, Calvo-Lobo C, López-López D, Benito-de-Pedro AI, Romero-Morales C, San-Antolín M, et al. Electromyographic Assessment of the Efficacy of Deep Dry Needling versus the Ischemic Compression Technique in Gastrocnemius of Medium-Distance Triathletes. Sensors 2021;21. Doi:10.3390/s21092906.

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Authors' contributions: M.A: conceptualization of the study and design of the tension headache band. All authors contributed to formal analysis; investigation; methodology; writing – original draft; writing – review and editing; and final approval of the version to be published.
Conflict of interest: The authors declare no conflict of interest related to the preparation and content of this work.
Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or non-profit sectors.
Acknowledgement: The authors would like to thank all participants who engaged in the current study.