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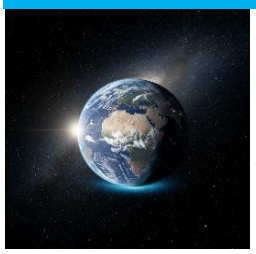

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Non-Pharmacological Therapies in the Management of Tension-Type Headache – A Literature Review

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Abstract

Background

Tension-type headache (TTH) is, alongside migraine, the most common primary headache disorder worldwide and a major cause of years lived with disability. While often mild and self-limiting, a significant proportion of patients develop frequent or chronic TTH, defined as headache occurring on ≥15 days per month for more than three months. Chronic TTH is associated with reduced quality of life, decreased productivity, and increased use of analgesics, raising the risk of medication-overuse headache. These challenges highlight the importance of effective non-pharmacological management strategies.

Aim

The aim of this review was to summarize evidence published between 2015 and 2025 regarding the effectiveness of non-pharmacological interventions in the management of tension-type headache.

Methods

A structured search of PubMed and Google Scholar was conducted for studies published between 2015 and 2025. Eligible publications included randomized controlled trials, systematic reviews, meta-analyses, and cohort studies evaluating non-pharmacological interventions in

adults with episodic or chronic TTH. Due to heterogeneity in study design and outcome measures, a qualitative narrative synthesis was performed.

Results

The strongest evidence supports multimodal physiotherapy approaches, including manual therapy, strengthening and stretching exercises, and aerobic training, which were associated with reductions in pain intensity and headache frequency. Psychological interventions—particularly cognitive behavioral therapy, relaxation techniques, biofeedback, and mindfulness-based approaches—showed moderate to strong evidence for reducing headache frequency, pain intensity, and stress-related symptoms. Emerging data suggest that dietary supplementation, such as magnesium, omega-3 fatty acids, and vitamin D in deficient individuals, may provide modest additional benefit. Non-pharmacological interventions appear most effective when integrated within a multidisciplinary treatment strategy.

Conclusions

Non-pharmacological interventions represent an evidence-based component of TTH management. Physiotherapy and psychological therapies demonstrate the most consistent benefits, while supplementation may serve as an adjunct in selected patients. Further high-quality randomized trials with standardized outcomes are needed.

Key words

tension-type headache; chronic tension-type headache; non-pharmacological treatment; physiotherapy; manual therapy; cognitive behavioral therapy; relaxation; biofeedback; supplementation; omega-3 fatty acids; magnesium; vitamin D; primary care

1. Introduction

Tension-type headache (TTH), alongside migraine, is the most common type of primary headache disorder. Epidemiological data indicate that the lifetime prevalence of headache in the European population exceeds 90%, with an annual prevalence of 79%, and nearly equal proportions of migraine (35%) and episodic tension-type headache (38%)[1]. The Global Burden of Disease study classifies migraine and TTH as the second leading cause of years lived with disability worldwide[2].

The International Headache Society defines chronic tension-type headache (CTTH) as a disorder characterized by mild to moderate, pressing or tightening pain, usually bilateral, which may be accompanied by mild nausea, photophobia, or phonophobia. Differentiating TTH from migraine can be challenging due to their often overlapping phenotypic features resulting from shared pathophysiological mechanisms. CTTH is defined as headache occurring on 15 or more days per month for more than three months, or at least 180 days per year. The detailed diagnostic criteria are presented in Table 1[3].

Table 1. ICHD-Based Diagnostic Criteria for Tension-Type Headache Subtypes

Infrequent episodic tension-type headache	**Frequent episodic tension-type headache**	**Chronic tension-type headache**
Headache attacks occurring on less than 1 day per month At least 10 headache episodes Duration of pain from 30 minutes to 7 days Bilateral, pressing or tightening, non-pulsating pain Mild or moderate intensity Not aggravated by routine physical activity No nausea or vomiting Photophobia or phonophobia may be present	At least 10 headache attacks occurring on 1–14 days per month for more than 3 months (12–180 days with headache per year) Duration of pain from 30 minutes to 7 days Bilateral, pressing or tightening, non-pulsating pain Mild or moderate intensity Not aggravated by routine physical activity No nausea or vomiting Photophobia or phonophobia may be present	Headache occurring on at least 15 days per month for more than 3 months Duration from several hours to several days or continuous pain Bilateral, pressing or tightening, non-pulsating pain Mild or moderate intensity Not aggravated by routine physical activity No severe nausea or vomiting One of the following may be present: photophobia, phonophobia, or mild nausea

In most cases, the disease has a mild course; however, in a portion of the general population, it takes the form of chronic headaches, leading to a significant reduction in quality of life and increased consumption of painkillers. Therefore, increasing emphasis is being placed on

identifying evidence-based non-pharmacological methods that can complement pharmacotherapy in prevention. The diagnosis of tension-type headaches does not require additional tests and can be made in primary care settings, provided that situations suggesting secondary headaches are considered. In primary care, both acute and preventive treatment of tension-type headaches can also be carried out. The article presents data regarding the effectiveness of non-pharmacological methods in treating TTH.

Standard management of tension-type headaches in primary care

Tension-type headache (TTH) is one of the most common reasons for visits in primary care and can often be effectively diagnosed and treated in outpatient settings [1,3]. As part of standard management, family doctors should primarily:

1. Diagnosis and differentiation

   The diagnosis of TTH is mainly based on history and clinical examination, without the need for routine imaging or laboratory tests, provided there are no alarm features suggesting a secondary headache (so-called “red flags”), such as sudden, very severe pain, neurological symptoms, change in pain character, or headache after head trauma [4, 5].

   Characteristic features of TTH include bilateral pain with a pressing or tightening quality, mild to moderate intensity, non-pulsating, which does not worsen during daily physical activity. Nausea and vomiting are usually absent, while mild photophobia or phonophobia may be present [4].
2. Acute management

   In episodic TTH, standard management primarily involves acute treatment with general painkillers such as paracetamol or nonsteroidal anti-inflammatory drugs (NSAIDs), used at the lowest effective dose and for the shortest duration possible to limit the risk of medication-overuse headache [4, 5].

   In primary care, preventive pharmacological treatment is usually limited to patients with chronic TTH, and the decision to initiate it should be made individually, taking into account the risk of side effects and medication overuse [4, 5].
3. Monitoring and follow-up

   The family doctor should conduct systematic monitoring of the patient, assessing the effectiveness of the methods used, the frequency and intensity of headaches, the impact

on functioning, and any adverse effects of medications. If there is no improvement or concerning symptoms appear, a neurological consultation should be considered [4, 5].

2. Methods

The analysis included studies published between 2015 and 2025, with particular emphasis on publications after 2020. We conducted a systematic search of available sources in the databases PubMed and Google Scholar. These included randomized clinical trials, cohort studies, as well as systematic reviews and meta-analyses on non-pharmacological methods for treating tension-type headache [4–8]. The analyzed interventions were grouped into four main categories: physiotherapy and manual therapy, psychological and behavioral interventions, physical activity and lifestyle modifications, and complementary medicine methods.

We decided on a qualitative narrative synthesis to summarize the results in an organized, descriptive manner. The following keywords and their combinations using Boolean operators were applied: "tension-type headache", "chronic tension-type headache", "non-pharmacological treatment", "physiotherapy", "manual therapy", "exercise", "biofeedback", "cognitive behavioral therapy", "relaxation", "mindfulness", "acupuncture", "dry needling", "lifestyle intervention", "sleep hygiene", "stress management". Example search strategies included: "tension-type headache AND physiotherapy", "chronic tension-type headache AND biofeedback", "tension-type headache AND acupuncture", "tension-type headache AND cognitive behavioral therapy".

The most frequently analyzed endpoints were pain intensity (VAS/NRS), number of headache days per month, duration of headache episodes, quality of life, and use of painkillers [[4–6]]. The observation period was usually 8 to 12 weeks, although in some studies it extended to 6–12 months [6, 8].

NON-PHARMACOLOGICAL METHODS

3. Results

Physiotherapy and Manual Therapy

The largest number of publications concerned physiotherapeutic interventions, including manual therapy, therapeutic exercises, and soft tissue techniques [5, 6, 8]

Randomized clinical trials published after 2020 demonstrated that manual therapy leads to a significant reduction in pain intensity and the number of headache days per month compared with standard treatment [6, 9]. In studies comparing cervical spine manipulation, myofascial techniques, and therapeutic exercises, all interventions showed superiority over standard care, with the greatest effects observed in combined programs [6, 8].

Meta-analyses from 2023–2025 confirm that physiotherapy significantly reduces both pain intensity and frequency, while also improving patient functioning [6, 8]. The best outcomes were achieved in programs including strengthening exercises for the neck and shoulder girdle muscles, stretching, and elements of postural re-education[6].

3.1 Psychological and Behavioral Interventions

Psychological interventions such as cognitive behavioral therapy, biofeedback, and relaxation training constitute an important component of TTH treatment, particularly in its chronic form [10, 11]. Some studies have demonstrated the superiority of self-regulation–based interventions over standard care [10].

Meta-analyses indicate that these interventions lead to a significant reduction in the number of headache days and pain intensity, as well as improvement in psychosocial functioning [8,15]. Studies have also observed reduced use of pain medications and improved sleep quality [9,15]. The greatest effectiveness was demonstrated by multicomponent programs combining several psychological techniques [10, 11].

When interpreted in the context of other non-pharmacological interventions presented in Table 2, psychological therapies appear to provide complementary benefits to physical interventions such as physiotherapy and manual therapy. For example, studies evaluating

physiotherapeutic approaches have reported clinically meaningful reductions in pain intensity and headache frequency. In a randomized trial manual therapy resulted in a reduction of pain intensity by approximately 2 points on the VAS scale and a decrease in the number of headache days after 8 weeks of treatment [9]. Similarly, strength training of neck and shoulder muscles led to a reduction in pain intensity by up to 2.5 VAS points and improved quality of life after 12 weeks [6]. Systematic reviews and meta-analyses also confirm that physiotherapy interventions—including exercises, stretching, and spinal manipulation—significantly reduce both pain intensity and the number of headache days in patients with chronic TTH [5,8]. Additional studies have demonstrated improvements in muscle function and reductions in headache frequency following targeted neck and shoulder exercises or aerobic training [12,13].

Taken together, these findings suggest that the most effective management strategy for TTH may involve a multimodal approach combining psychological therapies with physiotherapy-based interventions, addressing both the psychosocial and musculoskeletal mechanisms contributing to headache chronification.

Table 2. Manual Therapy and Physiotherapy in the Treatment of Tension-Type Headache – Review of Studies (2020–2025) – summary

Author, year	**Intervention**	**Observation period**	**Main endpoints**	**Results / clinical effect**
Espí-López et al., 2022 [9]	Manual therapy vs foam rolling	8 weeks	Pain intensity (VAS), number of headache days	Pain reduction by 2 VAS points, decrease in headache days by 44
Cumplido-Trasmonte et al., 2021 [5]	Manual therapy, neck muscle exercises	4–12 weeks	Pain intensity, quality of life	Significant reduction in pain intensity and improvement in functioning
Frontiers Neurology Study Group, 2023 [6]	Strength training of neck and shoulder muscles	12 weeks	Pain intensity (VAS/NRS), duration of episodes, quality of life	Reduction in pain intensity by 2.5 VAS points, decreased episode duration, and improved quality of life
Meta-analysis physiotherapy in chronic TTH, 2025 [8]	Physiotherapy (exercises, stretching, spinal manipulation)	4–12 weeks	Pain intensity, number of headache days	Significant reduction in pain and number of headache days
Andersen et al., 2017 [12]	Neck and shoulder girdle muscle exercises	8 weeks	Pain intensity, muscle function	Pain reduction by 1.8–2.0 VAS points, improvement in muscle function
Krøll et al., 2018 [13]	Aerobic exercise vs relaxation	10 weeks	Pain intensity, number of headache days	Aerobic exercise: reduction in headache days by an average of 3 days/month

3.2 Physical activity and lifestyle modifications

Regular physical activity, particularly exercises targeting the neck and shoulder muscles as well as aerobic training, shows a beneficial effect on the course of TTH [6, 13, 15].

Exercise programs lasting 8–12 weeks led to significant reductions in pain intensity and the number of headache episodes, as well as improvements in muscle function [6, 15]. In studies comparing aerobic exercise with relaxation techniques, both interventions had a positive effect, but greater improvements in physical parameters were observed in the physically active groups [13], indicating long-term benefits of maintaining regular physical activity.

Interventions including health education, sleep hygiene, and stress management strategies showed moderate effectiveness, especially in the context of long-term symptom control [4, 10].

In addition, the psychological and behavioral interventions summarized in Table 3 further support the role of lifestyle-oriented approaches in TTH management. Studies evaluating cognitive behavioral therapy, relaxation training, biofeedback, mindfulness, and yoga reported reductions in pain intensity of approximately 1–2 VAS points and decreases in headache days by about 3 days per month, along with improvements in quality of life and reduced stress levels [8,10,11,14]. These findings highlight that combining regular physical activity with behavioral and stress-management strategies may provide complementary benefits in long-term TTH control.

Table 3. Psychological and Behavioral Interventions in TTH Review of Studies (2020–2025) – summary

Author, year	Intervention	Observation period	Main endpoints	Results / clinical effect
Probyn et al., 2017 [10]	CBT, relaxation training, biofeedback	4–12 weeks	Pain intensity, number of headache days, quality of life	Significant reduction in headache days (average –3 days/month) and pain reduction by 1–2 VAS points
Nestoriuc et al., 2019 [11]	Biofeedback + relaxation training	8 weeks	Pain intensity, psychosocial functioning	Pain reduction by 1.5 VAS points, improved quality of life and reduced stress
Psychological therapies meta-analysis, 2025 [8]	CBT, relaxation, mindfulness	4–16 weeks	Pain intensity, number of headache days, medication us	Significant reduction in pain intensity and number of headache days, reduced medication use
Wells et al., 2021 [14]	Mindfulness and Yoga	10 weeks	Pain intensity, number of headache days, stress	Pain reduction by 1.2 VAS points, decreased stress levels
Probyn et al., 2019 [10, 13, 15]	CBT + patient education	12 weeks	Pain intensity, quality of life	Pain reduction by 2 VAS points, improved quality of life and well-being

3.3 Complementary medicine

Among complementary methods, acupuncture, dry needling, and interventions such as yoga and mindfulness were most frequently analyzed [4, 7, 14, 16].

Meta-analyses indicate that acupuncture significantly reduces headache frequency and increases the proportion of patients achieving clinically meaningful improvement [7, 17]. Studies on dry needling show potential effectiveness in reducing myofascial pain, although results are less consistent [16].

Yoga and mindfulness interventions show moderate effectiveness, particularly in reducing stress and muscle tension, which translates into a lower frequency of headaches [14].

3.4 Supplementation and dietary interventions

In recent years, interest has grown in the role of dietary interventions and supplementation in the treatment of tension-type headache. Specifically, studies have analyzed the effects of omega-3 fatty acids, magnesium, vitamin D, and multicomponent preparations containing B vitamins. Several studies have also shown a potential role of magnesium supplementation in reducing muscle tension and improving nervous system function, which translated into a lower frequency of headache episodes [18]. Vitamin D deficiency, on the other hand, has been associated with a higher frequency of chronic headaches, and supplementation led to a moderate reduction in pain intensity in both observational and interventional studies [18].

The studies summarized in Table 4 present examples of supplementation strategies evaluated in clinical research. Omega-3 fatty acids (EPA+DHA at a dose of approximately 1.8 g/day) administered for 12 weeks were associated with a reduction in pain intensity by about 1.3 points on the VAS scale and a decrease in headache days by approximately 2.5 days per month [20]. Similarly, vitamin D3 supplementation (2000 IU/day) over a 12-week period resulted in a reduction in pain intensity of about 1 VAS point and improvement in quality of life indicators [19]. These findings suggest that dietary supplementation may represent a supportive strategy in the non-pharmacological management of TTH.

Table 4. Dietary Interventions and Supplementation in TTH (2020–2025) - summary

Author, year	Intervention	Dose	Observation period	Main endpoints	Results / clinical effect
Omega-3 [20]	**Omega-3 (EPA+DHA)**	**1,8 g/day**	**12 weeks**	**VAS, headache days**	**↓ pain by 1.3 VAS; ↓ headache days by 2.5/month**
Vitamin D [19]	Vitamin D3	**2000 IU/ day**	**12 weeks**	**VAS, quality of life**	**↓ pain by 1 VAS point; ↑ quality of life**

Preparations containing B vitamins, particularly B2 (riboflavin), B6, and B12, have been studied mainly in the context of migraine, but some research suggests their potential supportive effect in TTH as well, through influence on energy metabolism and nervous system function [19].

It should be emphasized, however, that while the results of supplementation studies are promising, the number of high-quality randomized clinical trials directly addressing TTH remains limited, and the heterogeneity of doses and protocols makes it difficult to draw definitive conclusions about the effectiveness of these interventions.

3.5 Summary of results

The collected data indicate that non-pharmacological methods for treating tension-type headaches are effective and should be an integral part of therapy. The strongest evidence concerns physiotherapy and psychological interventions, while complementary methods provide a valuable supplement to treatment, especially within a multidisciplinary care model.

4. Discussion

This review presents the current scientific evidence on non-pharmacological methods for treating tension-type headaches (TTH). The collected data indicate that non-

pharmacological interventions are effective and safe, and can be used both as first-line therapy in mild to moderate cases and as a complement to pharmacotherapy in chronic cases [4, 5, 7].

4.1 Interpretation of main findings

The strongest evidence supports physiotherapy and manual therapy interventions. The analyzed studies demonstrated significant reductions in pain intensity, number of headache days, and improvements in patient functioning [5–7]. The mechanisms of these effects are multifactorial, including reduced muscle tension, improved musculoskeletal function, and modulation of pain processing in the central nervous system.

Psychological interventions, particularly cognitive-behavioral therapy, biofeedback, and relaxation techniques, also play an important role. Their effectiveness stems from their influence on psychological factors such as stress, emotional tension, and coping strategies, which are key in TTH pathophysiology [8, 10, 11]. Studies show that these interventions can reduce both the subjective experience of pain and its impact on daily functioning.

Research on physical activity indicates that regular exercise, especially targeting neck and shoulder muscles, improves muscular endurance, reduces muscle tension, and alleviates pain symptoms [12, 13, 15]. Additionally, physical activity positively affects stress regulation and sleep quality, which may indirectly reduce the frequency of headache episodes.

Complementary medicine methods, such as acupuncture or mindfulness techniques, show moderate but clinically relevant effectiveness, particularly as part of a multimodal therapy approach [7, 14, 17]. Their effects may be related to modulation of the nervous system and influence on inflammatory and neurotransmitter mechanisms.

Dietary interventions and supplementation are also receiving increasing attention. Studies on omega-3 fatty acids suggest potential anti-inflammatory and analgesic effects, which may reduce headache frequency and intensity [16,17]. Similarly, magnesium and vitamin D supplementation may support nervous system function and reduce susceptibility to headache episodes, although evidence for TTH remains limited and further research is needed [18, 19].

4.2 Clinical significance and practical implications

From a clinical perspective, these findings emphasize the need for a multidisciplinary approach in TTH management. Non-pharmacological interventions may be particularly beneficial for patients with chronic headaches who are at risk of analgesic overuse.

Integrating physiotherapy, psychological interventions, and patient education into standard care can lead to significant improvements in quality of life and reduce healthcare costs. Moreover, non-pharmacological therapies have a favorable safety profile and can be used long-term.

4.3 Limitations of available studies

Despite the growing number of publications, several limitations exist in the current data. Key issues include heterogeneity of study populations, differences in endpoint definitions, and varied intervention protocols. Many studies had small sample sizes and relatively short observation periods.

Furthermore, some studies lacked standardized interventions or used mixed therapy combinations, complicating the evaluation of specific technique effectiveness. Regarding dietary and supplementation interventions, the number of studies directly addressing TTH remains small.

4.4 Directions for future research

Future research should involve well-designed randomized clinical trials with longer follow-up periods to assess the durability of therapy effects. It is particularly important to determine optimal intervention protocols and identify patient subgroups who may benefit most from specific treatments.

Further studies should also evaluate the effectiveness of multimodal interventions and the role of dietary interventions and supplementation in TTH therapy.

5 Conclusion

In conclusion, current evidence indicates that non-pharmacological methods for treating tension-type headaches are effective and constitute an important component of comprehensive

care. The greatest effectiveness is observed with approaches combining physiotherapy, psychological interventions, and patient education, supporting the rationale for a multidisciplinary care model in TTH management..

Disclosures

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Conceptualization: MK, MS, AP;

Methodology: MK, KC, PC;

Formal analysis: MK, MS, MSl;

Investigation: MSl, KZ, IG;

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