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Pharmacological and nonpharmacological treatment of tension-type headache

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Abstract

Introduction and purpose: Tension-type headache (TTH) is known to be the most prevalent form of primary headache with a 1-year prevalence of about 26%. About 3 billion people experienced tension type headaches or migraine in 2016. Prevalence rate appears to be highest at 35-39 years of age. Some patients suffer from chronic tension-type headaches (CTTH) when the pain appears during 15 days of a month for 3 months continuously. This review aims to summarize current knowledge in pharmacological and non-pharmacological treatment of this condition.

Material and methods: Medical databases like PubMed and Google Scholar were searched for scientific papers on the pharmacological and non-pharmacological interventions in tension-type headache. These were analyzed and summarized in this review.

State of knowledge: Pharmacological treatment of acute tension-type headache is based on non-steroidal anti-inflammatory drugs (NSAIDs), especially ibuprofen, and acetaminophen. For preventive treatment amitriptyline, opipramol and selective serotonin reuptake inhibitors are used. Among non-pharmacological treatments we distinguish physical methods like acupuncture, myofascial trigger points therapy, extracorporeal shockwave therapy, physical

exercises (aerobic and strengthening), Transcutaneous Electrical Nerve Stimulation and yoga. Psychological therapy is an additional procedure for reducing the pain.
Conclusion: However there are many possibilities of treatment both pharmacological and non-pharmacological, it is still a wide area to investigate.

Keywords: headache, non-pharmacological treatment, tension-type headache, acupuncture, TENS

Introduction and purpose

Tension-type headache (TTH) is recognized as the most prevalent form of primary headache. It is clinically characterized by bilateral, pressing, or tightening pain of mild to moderate intensity that does not escalate with physical exertion and is typically devoid of associated symptoms like nausea or vomiting. Its ubiquity and substantial effect on the quality of life of affected individuals underscore the necessity of a thorough understanding of its pharmacological and non-pharmacological management options.

Pharmacological interventions for TTH predominantly involve the administration of analgesics, including non-steroidal anti-inflammatory drugs (NSAIDs) and acetaminophen (paracetamol). For chronic manifestations of TTH, prophylactic pharmacotherapy, particularly with tricyclic antidepressants such as amitriptyline, has demonstrated efficacy in attenuating the frequency and severity of headache episodes. Nevertheless, the prolonged use of analgesics necessitates prudence, given the potential for medication-overuse headaches and other adverse effects.

Non-pharmacological modalities of TTH management encompass relaxation training, cognitive-behavioral therapy (CBT), and physical therapy strategies like cervical and neck muscle massages and stretching exercises. Evidence supports their utility in mitigating muscle tension and psychological stress, which are critical precipitating factors for TTH. Furthermore, preventive measures, including lifestyle optimization such as routine physical activity, adherence to sleep hygiene protocols, and stress management, are instrumental in reducing recurrence rates.

The objective of this scholarly review is to elucidate the contemporary pharmacological and non-pharmacological therapeutic paradigms for tension-type headache, with a particular emphasis on their clinical efficacy, safety profiles, and applicability in routine healthcare settings [1,2].

State of knowledge

1. Tension-type headache

In 2016 nearly 3 billion people were estimated to experience tension-type headache or migraine [3]. It makes tension type headaches (TTH) along with migraine the most common primary headache disorders. Although the International Classification of Headache Disorders (ICHD-3) characterizes the symptoms of Tension type headaches, nowadays there is no specific diagnostic test for TTH and the diagnosis is based on clinical assessment [4] especially on history and examination [5]. The TTH 1-year prevalence is about 26% and is slightly more common in women but the advantage over men is not as significant as it is in migraine. The age of onset is typically under 30 years of age but the prevalence peaks between ages 35–39 [4]. Interestingly the prevalence of episodic tension-type headache increases along with educational levels. The opposite trend is observed in the case of chronic tension-type headache [6].

If the tension-type headaches occur on 15 or more days a month for at least 3 months it is called Chronic tension-type headache (CTTH). The prevalence of CTTH according to different studies is estimated around 2%. 40 % of patients suffering from CTTH have a family history of headache. 15 % of patients develop symptoms before the age of 10 [7].

The exact cause of tension-type headaches (TTH) remains unclear. However, the most plausible explanation for infrequent episodes is the activation of overly sensitive peripheral afferent neurons in the muscles of the head and neck. Muscle soreness and psychological stress are often linked to TTH and can worsen its symptoms, though they are not definitively proven as direct causes [8]. In fact, the most common precipitating factors for TTH are stress and mental tension [9]. Additionally, some individuals with TTH exhibit altered pain processing in the central nervous system and an overall heightened sensitivity to pain. Genetic

predisposition also plays a role in increasing the likelihood of developing tension-type headaches [8].

Pathophysiology of tension type headaches can be associated with peripheral mechanisms, especially if headaches do not occur regularly, or central mechanisms. Chronic or regularly recurring tension type headache can be activated by both peripheral and central mechanisms. The main cause of the peripheral system activation is hyperexcitable peripheral nociceptors activated by overstretching the muscles or problems with body posture like scoliosis. Nociceptors trigger neural impulses in response to physical stimuli, making sensitivity of the central nervous system higher. Whole process creates an ongoing loop where the stimulus is constantly smaller while the amplitude of the response grows bigger [10].

The nociceptive impulses then go through the trigeminovascular system which also links nerves and blood vessels. Trigeminothalamic tract conducts impulse through ventral posterior medial and ventral posterior lateral nuclei of thalamus to primary somatosensory cortex responsible for pain sensation. Researchers studied nitric oxide's role in TTH pathogenesis by describing connection between nitric oxide intake and developing the headache. Further studies should be conducted [4].

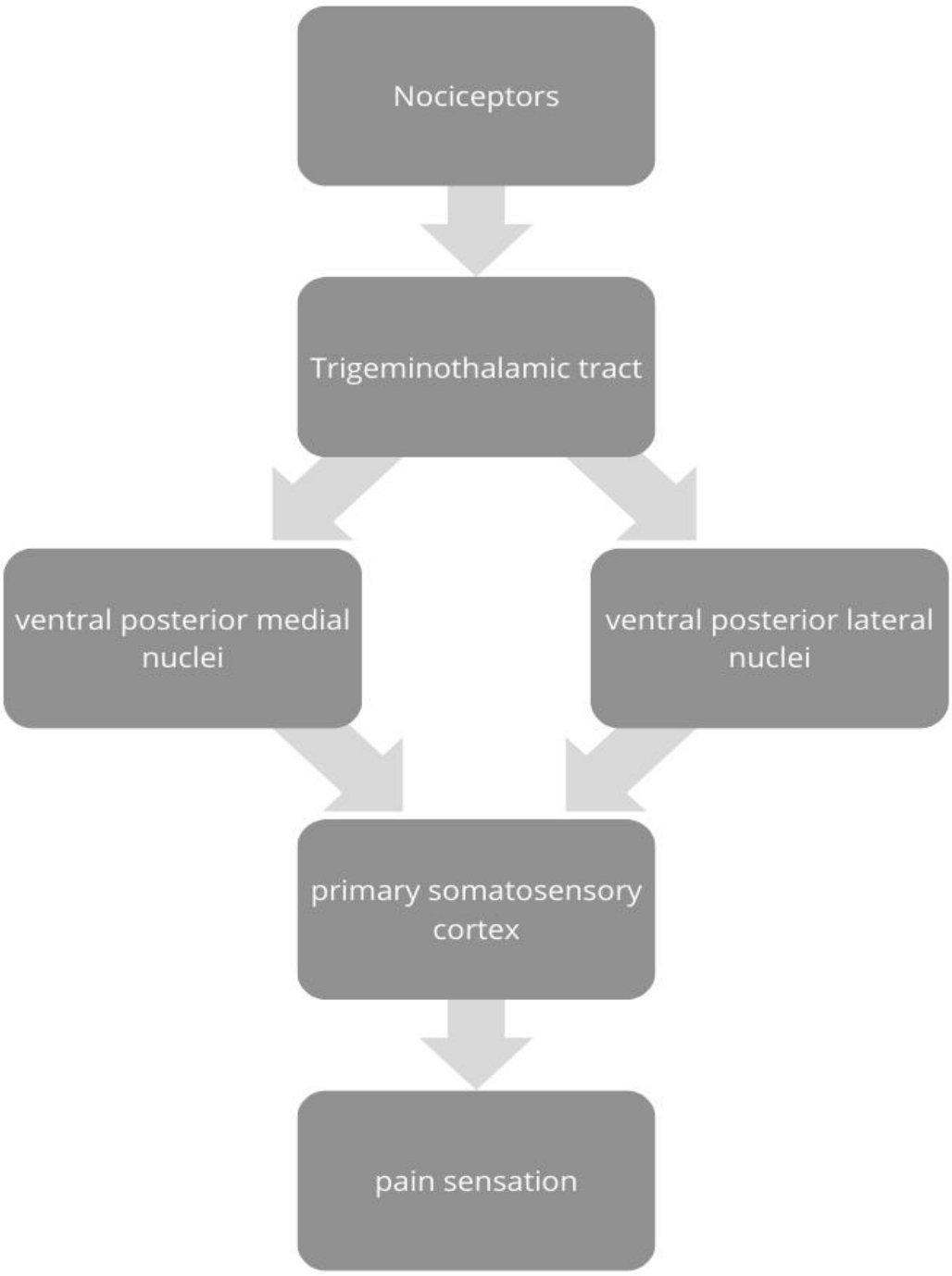

Fig. 1. Nociceptive pathway

2. Pharmacological treatment of tension type headache

The pharmacological treatment of tension type headache can be divided into acute and prevent treatment [4]. The main pharmacological treatment of tension-type headaches is non-steroidal anti-inflammatory drugs (NSAIDs), which are used to stop pain attacks. Ibuprofen 400mg and acetylsalicylic acid 500mg are mainly prescribed in the primary treatment. Long-term use of pain relievers can lead to chronic headaches which are also called drug-induced headaches [11]. Among NSAIDs the highest efficacy in TTH treatment is ibuprofen and ketoprofen. In case of NSAIDs intolerance simple analgesics like paracetamol(acetaminophen) can be administered [4]. Alnasser et al. summarized studies about using paracetamol and ibuprofen in treating tension type headaches. Standard oral dose of paracetamol is 1000 mg whereas ibuprofen 400 mg. Results of studies showed that paracetamol had a better effect on reducing the pain at 1 hour after intake and ibuprofen after 2 hours [12]. What is more, the efficiency of paracetamol may be increased by combination with acetylsalicylic acid and caffeine [13]. In the preventive treatment, tricyclic antidepressants: amitryptiline(up to 75 mg) and opipramol(up to 100mg) or selective serotonin reuptake inhibitors: fluoxetine, fluvoxamine and sertraline. Tizanidine (4mg) can be used as a supportive treatment [14]. However, Banzi et al. confirmed citalopram, sertraline, fluoxetine, paroxetine, fluvoxamine (SSRIs) and venlafaxine (SNRIs) were no better than placebo in treatment of tension type headaches [15].

A lot of medications have been investigated for effectiveness in TTH treatment but have not been incorporated into standard treatment guidelines. Alprazolam decreased headache index but have no influence on headaches frequency and the adverse effects was observed in 16,67% patients [16]. Mirtazapine reduced frequency, duration, and intensity with good tolerance but the study group was small [17].

3. Nonpharmacological treatment of tension type headache

Non-pharmacological treatment of tension type headaches (TTH) can be used to improve comfort of life. Onan et al. described methods as acupuncture, physical exercises (strengthening, aerobic, cranio-cervical), stretching or manual therapy [4]. Acupuncture and manual therapy decrease the frequency of chronic headaches [18]. Aerobic training does not

reduce pain intensity [19] but frequency of headaches lowers. Stretching also could improve headaches recurrence [4].Strength training proved mediocre reduction of symptoms [19].

3.1 Acupuncture

Acupuncture is the only non-pharmacological intervention that is recommended by The National Institution for Health and Care Excellence (NICE) guidelines for TTH. It involves inserting needles at selected points known as acupoints. Few randomized controlled trials have proved that acupuncture performs an anti-inflammatory effect and can relieve headache symptoms. Moreover acupuncture used in TTH treatment may reduce headache days and decrease the consumption of acute medicine [20]. Linde et al. review also points out that acupuncture as an addition to routine treatment of TTH reduces the frequency of headaches in the short-term (3 months). The effect over a 3 month period of time was not investigated [21].

3.2 Myofascial trigger points

Myofascial trigger point is a hyperirritable spot in skeletal muscle that is painful in compression. It is associated with tender, palpable nodules located in a taut band. Pressing on this spot may lead to referred pain, motor dysfunction and autonomic phenomena. Active and latent MTrPs are commonly observed in TTH and interestingly active MTrPs are observed almost only in TTH patients [22]. During six-week research, Moraska et al. found out not only myofascial trigger point massage therapy was effective for lowering the number of TTH episodes but also placebo method [23].

Although the massage focused on myofascial trigger point reduces the frequency of headache, it did not reduce the intensity or duration. Karadas et al. study showed reduced both frequency and intensity in comparison to placebo by repeated local lidocaine injections into the MTrPs in the pericranial muscles. Another study examined whether botulinum toxin A injections have similar effects. The researchers reported that headache frequency was reduced to disappear by the week of 12 [22].

Takekawa et al. presented a case of a 45-year old patient suffering from chronic tension type headache treated with myofascial trigger points and 2000 extracorporeal shock wave therapy to bilateral trapezius muscles. This led to improvement and the patient did not have to use any oral drugs. The patient was observed for 11 weeks and no further treatment was needed [24].

3.3 aerobic exercises

Aerobic exercises are effective in reducing the duration of the headaches associated with TTH. It is beneficial not only in TTH but also in cardiopulmonary, inflammatory, and neurovascular processes as well as its helpful on depression and anxiety management [20].

3.4 Strength-based exercise

Martín-Vera et al randomized controlled trial aimed to analyze the result of exercise programs based on resistance exercises in CTTH patients. As a result of 12-week strength training of the neck and shoulder region, decrease of pain intensity and duration was observed. There were no significant differences between the control group and the intervention group in the frequency of the headaches. What is more, the intervention group showed the improvement of the thickness of deep cervical muscles and strength of deep cervical flexors. The peripheral sensitization was decreased [25].

3.5 Transcutaneous Electrical Nerve Stimulation (TENS)

Transcutaneous Electrical Nerve Stimulation (TENS) is an effective method in treatment of all etiology headaches. The analgesic effect if TENS is probably achieved by inhibition of the pain pathways or increase of the pain reducing substances levels in the CNS. It reduces severity and frequency of headache and could be an alternative technique for pain relief in CTTH however it is not as good as pharmacological treatment with imipramine. It is worth noting that information about the use of TENS in CTTH treatment is still limited and available studies are based on a relatively small group of patients [26].

3.6 Yoga

Yoga is regarded as a complementary addition to holistic medicine with over 3000 years of legacy. That method connects both physical and psychic aspects. The former one aspect is associated with body, posture, breathing. The latter one is represented by consciousness, awareness, meditation and focus on stress management. Short-term effects of yoga on tension type headaches are decreased frequency, length and intensity of pain [27].

Yoga's well known components are described as asana, pranayama and dhyana. Asana is about posture, pranayama - breathing and dhyana - meditation. The other study also confirmed that short-term effects can be observed - such as viewed above - frequency, length and intensity of pain. No effects can be proved as long-lasting [28].

Psychological therapy is considered to be an addition to other methods because of its positive impact on reducing stress [29]. Although studies about psychological therapy are focused on treating headaches in general rather than TTH, cognitive behavioral therapy and mindfulness meditation seems to be promising as an additional treatment [30, 31]. It is worth noting that further examinations of methods for treatment of tension type headaches are necessary.

Intervention		**Reduction in frequency**	**Reduction in Intensity**
Acupuncture		+	
Aerobic Exercise		+	
Stretching Excercise		+	
Myofascial trigger points	**Massage**	+	
	lidocaine infection	+	+
	botulin injection	+	+
TENS		+	+
Yoga		+	+

Tab. 1. Summary of intervention effects

Conclusions

Tension-type headache (TTH) is the most common primary headache disorder, imposing a substantial burden on patients and healthcare systems alike. Although its pathophysiological underpinnings remain incompletely understood, accumulating evidence suggests that peripheral and central sensitization, genetic predisposition, and psychosocial factors jointly contribute to its complex etiology. While acute attacks are typically managed with nonsteroidal anti-inflammatory drugs or simple analgesics, patients with chronic or frequent TTH often require prophylactic pharmacotherapy—most notably tricyclic antidepressants—to reduce the frequency and intensity of episodes. Furthermore, relaxation training and cognitive-behavioral therapy are integral components of a comprehensive treatment strategy. It is important, however, to exercise caution when considering long-term analgesic use, given the well-documented risk of medication-overuse headache.

Non-pharmacological interventions, including acupuncture (as recommended by the National Institute for Health and Care Excellence), physical therapies (e.g., aerobic exercise, stretching, and resistance training), manual therapy, and transcutaneous electrical nerve stimulation (TENS), have demonstrated potential in diminishing headache frequency and enhancing patient quality of life. Nevertheless, the efficacy of these approaches and the optimal manner of integrating them with pharmacotherapy remain uncertain, warranting further rigorous, placebo-controlled clinical trials. In addition, psychological interventions, such as cognitive-behavioral therapy, may confer supplementary benefits by addressing underlying stressors and improving self-management strategies.

In conclusion, despite the breadth of available therapeutic modalities for TTH, critical gaps in the evidence base persist. Future research should prioritize direct comparative effectiveness studies, long-term safety evaluations, and personalized treatment paradigms that encompass biological, psychological, and social factors. Such endeavors will refine the therapeutic repertoire for TTH and ultimately guide clinicians toward more targeted, patient-centered management approaches.

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