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Local anesthetic administration for frequent episodic tension-type headache in the elderly

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ABSTRACT

Aims: Although various symptomatic and prophylactic treatments exist for frequent episodic tension-type headaches (FETTH) in the elderly population, the constrained efficacy and associated complications and side effects of standard treatments necessitate a search for novel therapeutic options. This study aimed to assess the therapeutic efficacy of locally administered lidocaine to the pericranial muscles in elderly patients with FETTH.

Methods: This retrospective pilot study included elderly patients suffering from FETTH who received weekly bilateral injections of 2 mL 0.5% local lidocaine into the trapezius, masseter, frontal, temporal, splenius capitis, sternocleidomastoideus, and semispinalis capitis muscles over 5 weeks. Patients with infrequent episodic and chronic tension-type headaches were excluded. The monthly number of painful days, visual analog scale (VAS) score, and monthly number of analgesics used were recorded before (pre-treatment) and eight weeks after (post-treatment) the treatment.

Results: The study included 31 elderly individuals, with a mean age of 68.42 years (minimum-maximum: 65-81 years). In comparison to pre-treatment levels, the post-treatment observations demonstrated statistically significant reductions in the number of painful days [(5.8±1.7) vs. (4.6±1.9), p=0.003], VAS scores [(74.3±14.2) vs. (59.5±25.4), p=0.001)], and the number of analgesics used [(6.6±3.2) vs. (4.8±3.7), p=0.001].

Conclusions: This study suggests that local lidocaine administration to the pericranial muscles could serve as an efficient alternative therapeutic approach for FETTH in the elderly.

Introduction

The primary headaches commonly encountered include cluster headaches, migraines, and tension-type headaches (TTH). Notably, TTH is the most prevalent headache type across all age groups globally (1). In community-based studies, a population survey revealed a one-year prevalence of 38.3% for episodic tension-type headache (ETTHA) and 2.2% for chronic TTH (2). Population studies have also shown that TTH occurs more frequently in women than in men (3).

As per the International Classification of Headache Disorders, ETTHA manifests with frequent bilateral episodes of pressing or tightening headaches, characterized by mild to moderate intensity lasting from minutes to days (4). Remarkably, the pain associated with ETTHA does not exacerbate with routine physical activity and lacks a connection with nausea, although photophobia or phonophobia may be present (4).

TTH is acknowledged as one of the most prevalent and burdensome neurological conditions globally, affecting individuals across all age groups (4). It significantly hampers activities of daily living (5). Given the increasing aging population, exploring effective treatment options for TTH in the elderly is paramount.

Although numerous factors contribute to the pathogenesis of TTH, the precise mechanism remains elusive (6). Current understanding suggests that pain modulation is influenced by nociceptive impulses originating from the pericranial and

myofascial tissues. These impulses lead to sensitization in the region of the cervical spinal dorsal root trigeminal nucleus and stimulate supraspinal neurons, originating from areas such as the thalamus (7). Supporting this hypothesis, a separate study noted a reduction in gray matter volume associated with pain processing in individuals with chronic TTH (8). Peripheral abnormalities in TTH lack definitive evidence; however, muscle-related factors, particularly in ETTHA, may play a crucial role (9,10). Comparative studies between individuals with ETTHA and those without headaches have revealed increased latent and active trigger points, a lowered pain threshold in nerve trunks, and decreased neck mobility in patients with ETTHA (6,11). These results indicate that the activation of peripheral nociceptors and heightened muscle sensitivity are prominent and consistent features in individuals with TTH (12).

Treatment strategies for TTH are categorized into acute and preventive approaches based on headache frequency (4). For acute symptom relief, the options include simple analgesics, combined analgesics, parenteral analgesics, or antiemetics (4). Preventive treatment typically involves the use of antidepressant drugs (13). However, it is crucial to be aware of potential side effects and to consider the risk of dangerous drug interactions (14). Despite the effectiveness of pharmacological treatments, they may come with side effects (14). Additionally, non-pharmacological treatment methods, while having fewer side effects, require more scientific data to establish their effectiveness (15).

In the management of ETTHA, local anesthetics such as lidocaine have emerged as a potential therapeutic tool. Studies have explored the administration of these agents through various routes to assess their efficacy in alleviating pain and improving the overall well-being of individuals with TTH (16). Administering local anesthetics to the pericranial muscles presents a promising approach to minimize drug use in the elderly, mitigating potential drug-related side effects and interactions (16). Notably, there is a gap in the literature concerning frequent episodic tension-type headaches (FETTH), specifically in the elderly population. Recent administration of local anesthetics to the pericranial muscles has shown promise in treating TTH (16). Therefore, the primary objective of this study was to investigate the efficacy of local lidocaine administration on FETTH in elderly individuals.

Methods

A retrospective pilot study was conducted at the Neurology Headache Department of Gülhane Training and Research Hospital. Patients over 65 years of age with FETTH were enrolled based on the 2018 guidelines of the International Headache Society (4), which include the following criteria: i) at least 10 episodes of headache occurring on average 1-14 days/month for >3 months (≥12 and <180 days/year), fulfilling criteria ii-v; ii) headaches lasting from 30 minutes to 7 days; iii) at least two of the following four characteristics: bilateral location, pressing or tightening (non-pulsating) quality, mild or moderate intensity, not aggravated by routine physical activity such as walking or climbing stairs; iv) no nausea or vomiting and no more than one of photophobia or phonophobia; v) headaches not better accounted for by another the International Classification of Headache Disorders-3 diagnosis (4).

Eligible patients had been diagnosed with FETTH for at least 6 months. They were evaluated for other headache types, and those with alternative diagnoses were excluded. Additional exclusion criteria were current use of analgesics for more than two weeks, having undergone surgery (including cervical and cranial surgery), use of antidepressants, antipsychotic, and antiepileptic drugs in the last 12 weeks, having received botulinum toxin type A treatment, history of sensitivity to local anesthetics in the past 24 weeks, treatment without medication, having a neuromuscular disease, uncontrolled hypertension, anemia or bleeding disorder, a history of malignancy, psychiatric diseases, or hypothyroidism/hyperthyroidism. To eliminate potential secondary causes, complete blood count, routine biochemical parameters, vitamin B12, thyroid function tests, ferritin, and folic acid levels in the medical records were evaluated. The study received approval from the University of Health Sciences Türkiye, Gülhane Training and Research Hospital Local Ethics Committee (protocol no: 2023-234, date: 25.10.2023).

Procedures and outcomes

We included patients who received a weekly 2 mL injection of 0.5% lidocaine for 5 weeks. The injections were administered into the temporal, splenius capitis, sternocleidomastoid, frontal, masseter, semispinalis capitis, and trapezius muscles. Pre-treatment and 8-week post-treatment follow-up endpoints were the monthly number of painful days, visual analog scale (VAS) score, and monthly number of analgesics used.

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences software, version 22.0 for Windows (IBM Corp., Armonk, NY: USA). Descriptive statistics included mean and standard deviation and percentages. Paired samples t-test was used to compare pre-and post-treatment measurements.

Results

The study involved 31 patients, with a median age of 73.2 [minimum-maximum (min-max): 65-81] years. There were 24 women [median age (min-max): 73.81 (66-81) years], while there were 7 male patients [median age (min-max): 72.65 (65-80) years].

The pre-and post-treatment results of the patients are summarized in Table 1. The mean number of painful days before

administering local anesthetic injections to the pericranial muscles in elderly patients with FETTH was 5.8±1.7. The following injections, the number of painful days decreased to 4.6±1.9, indicating a statistically significant reduction (p=0.003) (Figure 1). The mean pre-treatment VAS score of the patients was 74.3±14.2, it decreased to 59.5±25.4 following the local anesthetic administration, with a statistically significant difference (p=0.001) (Figure 2). The mean number of monthly analgesic use before local anesthetic injections was 6.6±3.2. Following local anesthetic injections, it decreased to 4.8±3.7, revealing a statistically significant reduction (p=0.001) (Figure 3).

Lidocaine injections were not associated with documented side effects in the medical records.

Table 1. Pre-and post-treatment number of painful days, pain intensity (VAS score) and number of monthly analgesics used

	Pre-treatment	Post-treatment	p value
Number of painful days, mean±SD	5.8±1.7	4.6±1.9	**0.003**
VAS score, mean±SD	74.3±14.2	59.5±25.4	**0.001**
Number of monthly analgesic use, mean±SD	6.6±3.2	4.8±3.7	**0.001**

SD: Standard deviation, VAS: Visual analog scale

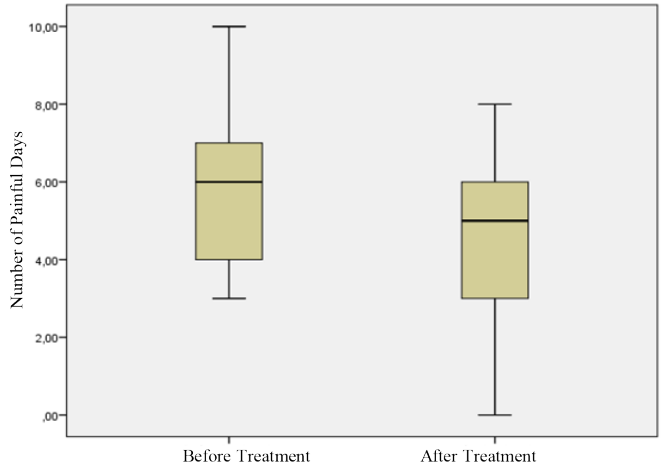

Figure 1. Comparison of pre-and post-treatment number of painful days

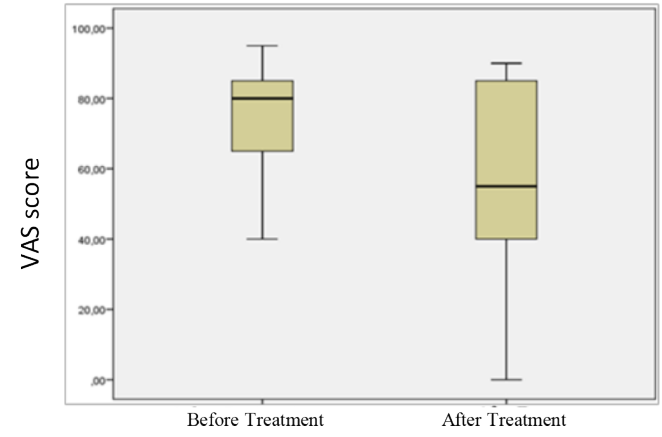

Figure 2. Comparison of pre-and post-treatment VAS scores
VAS: Visual analog scale

Discussion

This study assessed the efficacy of local administration of lidocaine at standard doses to the pericranial muscles in elderly patients with FETTH. The injections were performed once a week over a 5-week span. Upon the 2-month follow-up post-treatment, statistically significant improvements were observed compared with pre-treatment, specifically in the monthly number of painful days, pain intensity assessed by VAS, and monthly number of analgesics used.

Ongoing scientific research seeks to unravel the pathogenesis of TTH. The sensitivity of pericranial myofascial tissues can be influenced by psychological factors, potentially triggering increased peripheral nociceptive activity and subsequent pain attacks (17). While it has been suggested that central nociceptive mechanisms may contribute to chronic TTH (17), impulses originating from myofascial trigger points in the head and neck muscles, stimulated by C1-C3 or the trigeminal nerve, may also be involved (18). This could lead to heightened pain transmission and increased sensitivity of the central mechanisms, contributing to TTH (18). The administration of lidocaine to the pericranial muscles may be effective through this mechanism (19).

The efficacy of local anesthetics in managing ETTHA in the elderly involves intricate and multifaceted mechanisms (7). Lidocaine, the most extensively studied agent, is believed to act by blocking peripheral nociceptive signals and modulating central pain pathways (19). The effects of local anesthetics encompass three main aspects (19): i) Blockage of voltage-gated sodium channels. Local anesthetics such as lidocaine are recognized for their capacity to obstruct voltage-gated sodium channels in peripheral nerve endings. This action curtails the generation

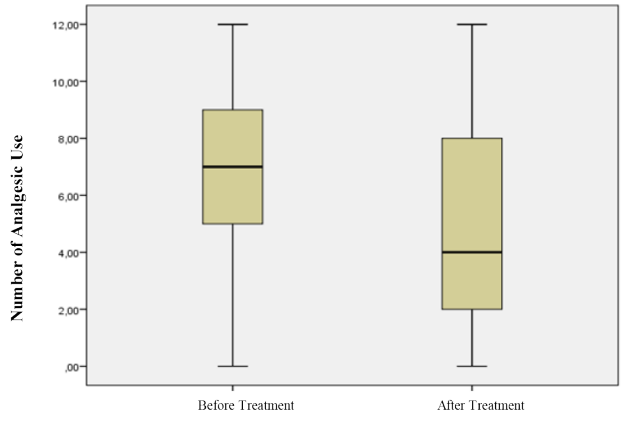

Figure 3. Comparison of pre-and post-treatment the number of analgesic use

and transmission of pain signals, effectively diminishing pain perception. Muscle relaxation at trigger points: TTH is often linked to heightened muscle tension, particularly in the neck and shoulder regions. Local anesthetics, when applied to trigger points, can induce muscle relaxation, mitigating the muscle tension that often precipitates TTH (19). iii) Modulation of central pain processing: beyond their peripheral effects, local anesthetics may also impact central pain processing. By diminishing incoming nociceptive signals, these agents can influence the central nervous system's perception of pain, offering additional relief to individuals experiencing TTH (20).

In a previous study, local lidocaine injections were administered three times to the pericranial muscles and trigeminal nerve exit points of 47 patients diagnosed with TTH (21). The results showed a decrease in the number of painful days, monthly analgesic use, and pain severity. Additionally, an improvement was noted in Hamilton's Depression and Anxiety Scale. However, the study did not evaluate the elderly population. Hence, the current study confirms the previous findings in a different age group.

Another study involved 108 patients diagnosed with TTH and administered 2 mL of 0.5% local lidocaine to the pericranial muscles (22). A reduction in pain intensity and the monthly number of painful days was observed in these patients (22). Our study shares similarities with that work concerning the administration procedure and findings. The primary distinction is that we focused on the elderly population. On the other hand, in contrast to our study, that study reported that lidocaine injections were effective for 6 months in patients with FETTH.

Venâncio et al. (23) conducted a comparative study assessing the effects of corticosteroids, dry needling, and lidocaine on myofascial trigger points in headaches. Their results indicated that the administration of lidocaine to myofascial trigger points was effective in alleviating headaches (23). In another study, they compared the use of botulinum neurotoxins type A, dry needling, and lidocaine on headaches, designating lidocaine as the primary option because of its cost-effectiveness (24). However, the authors focused on the adult population and included patients with TTH and migraine, introducing heterogeneity.

Different results have emerged from studies examining the use of local anesthetics in headaches. Karadaş et al. (25) similarly found that pericranial sensitivity served as a marker for a positive response to local lidocaine treatment in patients with episodic TTH associated with pericranial sensitivity. They concluded that pericranial sensitivity could influence the treatment outcomes of local lidocaine therapy. Their results also suggested that local lidocaine was both safe and effective in treating episodic TTH associated with pericranial sensitivity. On the other hand, in contrast to the current work, the patients were categorized based on pericranial muscle sensitivity. Furthermore, in contrast to our work, they administered 1% lidocaine injections every other day for 3 sessions to obtain improvements.

The evaluation of 25 patients aged 65 years diagnosed with TTH was also reported previously (26). Patients received local 0.5% lidocaine injections once a week for 4 sessions, resulting in a decrease in the number of painful days, pain intensity, and the number of analgesic use by the patients (26). Similarly, our study focused on the elderly population and employed a comparable treatment procedure. Both studies confirmed that local lidocaine administration to the pericranial muscles was an effective treatment option. The primary distinction was that we focused on a more specific group, namely, FETTH.

Variations among the studies so far may be attributed to factors such as the local anesthetic dose, research methodology, and duration of administration. Further well-designed clinical trials are essential to validate these results, establish standardized treatment protocols, and determine the long-term safety and efficacy of this approach.

Study Limitations

There are limitations of this study. Most importantly, the design was retrospective. The absence of a placebo group was also a significant limitation.

Conclusion

In conclusion, local lidocaine administration may be effective in treating FETTH in the elderly. The study demonstrated a reduction in the number of painful days, pain intensity, and the number of analgesics used due to headache.

Ethics

Ethics Committee Approval: The study received approval from the University of Health Sciences Türkiye, Gülhane Training and Research Hospital Local Ethics Committee (protocol no: 2023-234, date: 25.10.2023).

Informed Consent: Retrospective study.

Authorship Contributions

Surgical and Medical Practices: U.B.Ş., Concept: U.B.Ş., Design: U.B.Ş., Data Collection or Processing: U.B.Ş., Analysis or Interpretation: M.T., Literature Search: M.T., Writing: U.B.Ş.

Conflict of Interest: No conflict of interest was declared by the authors.

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