

Ocular Exercises as a Non Conventional Approach towards Tension-type Headache: A Narrative Review

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ABSTRACT

Tension-type Headaches (TTH) are the most prevalent type of headache, with upto 78% of people experiencing them at some point in their lives. In comparison to migraine, TTH is more incapacitating and results in more lost workdays. TTH has multifactorial aetiology which is thought to involve both, hereditary and environmental elements. There are three types of TTH: episodic, chronic, and frequent episodic. Patients describe their headache as tightness around the head, pressing, and dull. Studies on the impact of eye movement have been conducted and only top-notch experimental trials were applied in the study. Physiotherapy is one of the most effective method but at the same time, not much preferred by people due to lack of awareness. By the present review, it would be helpful, as people will start to use physiotherapy approaches. A moderate risk of bias was detected in the quality critical appraisal. With the information at hand, only a narrative description could be included. The present research only identified a few low quality studies, but its results imply that, ocular exercises can effectively alleviate primary headache and symptoms. More rigorous methodological standards and high quality Randomised Control Study (RCTs) are needed to validate and further understanding of the effects of organised workouts aiming to reduce pain intensity and frequency, symptoms, and medication use, among other things, in the treatment of primary headaches.

Keywords: Eyeball movement, Outcome measure, Physiotherapy rehabilitation

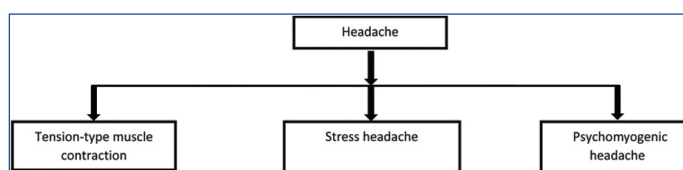
INTRODUCTION

Headache is a common complaint with clinical significance that is frequently misdiagnosed and undertreated. Significant headache morbidity includes inefficiency, work absences, and mental instability. With a lifetime prevalence of headaches of 96%, 46%-47% of people experience recurrent headaches, that meet the criteria for a primary headache disorder [1]. The International Headache Society (IHS) categorised various headache conditions in 1988, and the International Classification of Headache Disorders (ICHD)-3 beta version is now utilised for diagnosis after numerous updates [2]. The breadth of these illnesses' contributions to worldwide ill health, as well as the personal, societal, and economic difficulties they impose, have come into sharper focus in recent years [3]. The continuous accumulation of more reliable data over the course of 15 years has contributed to this expanding awareness [4]. It is crucial to provide effective therapy to adolescents with recurring and severe headaches since, childhood headaches have a significant probability of lasting into adulthood. A 73.9% of students with headaches take medication to treat their symptoms [5].

One of the key therapies for TTH is regarded as manual therapy. It is based on the analysis of muscle and joint movements based on biomechanical research to treat neuromusculoskeletal disorders. Numerous manual therapy techniques are applied in physiotherapy [6]. Before using any of these manual therapies, it is necessary to thoroughly examine the headache features in order to get an accurate diagnosis [7]. The non pharmacological method offers therapeutic approaches for headache treatment that can be evaluated, including manual therapy and therapeutic exercise. Manual therapy should be considered as an effective approach in improving the quality of life in patients with TTH [8]. According to the IHS, headaches can generally be divided into two categories which are primary and secondary headaches on the basis of the underlying pathology [9]. Primary headaches are not associated with pre-existing medical conditions and there are three types: migraines, tension-headaches and cluster-headaches. Secondary

headaches are related to a pre-existing medical condition [10]. Primary headaches are the most frequent and benign types of headaches [11]. There are many different types of headaches, such as those brought on by stress, muscle contractions, and psychomyogenic headaches [12]. Tension-type muscle contraction headache, stress headache, and psychomyogenic headache are three original subtypes of headache (TTH) [13,14]. Computers have reduced waiting times and increased professional success rates in the information era. However, it has increased the number of people with eye problems [15]. These days, ocular issues are frequently associated with irritability, redness, burning, tears, headaches, double vision, eye strain, and poor vision [16]. Eye strain, headaches, weariness, a burning feeling, wetness, and redness were the most common symptoms linked to computer use in India, according to ophthalmologists [17].

Stressful for both individuals and society as a whole is TTH, the most prevalent primary headache condition [18]. Chronic diseases can be treated with both pharmacological and non pharmacological methods; the latter have been more popular recently and can include anything from leading a healthy lifestyle to employing complementary or alternative medicine. Pharmacological therapy is the mainstay of clinical management and can be divided into acute and preventive treatments [19]. Different types of headache are illustrated in [Table/Fig-1] [20].



[Table/Fig-1]: Subtypes of headache [20].

Pathophysiology

From a socio-economic perspective, TTH are the most frequent and expensive headaches. The pathophysiological mechanisms behind TTH are still poorly understood, though. Physiological pain

may begin and spread as a result of psychological stress and poor coping strategies activating second messengers in pain-related downstream substrates [21]. The biopsychosocial model has been used to try and explain the pathomechanism of TTH. The psychosocial domain includes cognitive evaluation and emotional responses to situations that change the course of physiological processes at both the central and peripheral levels. The Central Nervous System (CNS) activity can influence or possibly be the source of muscular discomfort. It is a consequence of persistent secondary pulsation linked to acute pain, brought on by either changes to the descending inhibitory pain system or increased emotional stress (excitation of the autonomic system) [22].

The variety of this condition, which appears to be influenced by a complex interaction of genetic, environmental, and neuromuscular factors, that result in nociceptive system activation, has been the subject of recent investigations. In addition to the traditional analgesic treatments utilised during the initial assault, a number of therapeutic choices based on recently acquired experiences have developed in this condition [23]. TTH requires a global and multidisciplinary analysis since, it lacks a single substrate or typical site of pathogenesis. Here, the authors did a narrative overview of the most recent development encouraging the idea that, this condition is just the tip of a more serious individual malaise brought on by many changes [21]. Therefore, skilled professionals should still clear of merely symptomatic pharmacological approaches, and treatment should focus on taking control of the patient while taking into account the processes underlying this complicated disease [23]. The most typical visual aura symptoms include brilliant light flashes, cloudy or blurred vision, and zigzag lines. Eyeball exercises help to develop strong eyes, increases focus, reduce eye movements, and activate the brain's visual cortex. The purpose of the present investigation was to determine whether eye exercises can benefit those who get TTH [17].

Clinical Features

A mild to moderate intensity, bilateral, non throbbing headache without any other accompanying symptoms is the typical appearance of a TTH attack. The TTH discomfort is typically described in vague terms such as "dull", "pressure", "head fullness", "head feels enormous", or, more specifically, "like a tight cap", "band-like", or a "heavy weight on head or shoulder". Rarely, TTH patients may have intense, pulsing, or unilateral discomfort. For instance, in three Danish investigations, severe pain was found in 13%, pulsatile pain in 14%-20%, and unilateral pain in 10% [24].

Causes of Tension Type Headache (TTH)

Although, there is a known close connection between migraine and sleep problems, the impact of sleep problems on TTH has just lately been researched. People with TTH are more likely to experience insomnia than people without headaches [25]. According to a report, stress and mental tension are the main causes of TTH. Though, happen in migraines on a regular basis. Different main headache types, considerable head and neck motion triggers for episodic TTH patients, while foods, hunger, and odours are significantly more common in migraine individuals [24].

Lifestyle/Risk Factors

Obesity, excessive drinking, smoking, and inactivity, are all behaviours that pose health hazards [26]. In a small number of longitudinal population-based studies, the variety of this condition, which appears to be influenced by a complex interaction of genetic, environmental, and neuromuscular factors; that result in nociceptive system activation has been the subject of recent investigations. In addition to the traditional analgesic treatments, utilised during the

initial assault, a number of therapeutic choices based on recently acquired experiences have developed in this condition [27].

Outcome Measures

An evaluation of a migraine headache severity often considers its frequency, length, intensity, and disability. It is possible to follow the development of verbal and non verbal scales from standard ordinal scales, which ask patients to rank their pain as none, mild, moderate, or severe, or from 1 to 4, 1 to 10 etc., through verbal descriptor tests and numerical scaling approaches. The Visual Analogue Scale (VAS) is one of the most popular non verbal measuring method [28]. The six-item Headache Impact Test (HIT)-6 was created to assess and monitor headache sufferers. The negative effects of headaches on social functioning, role functioning, energy, cognitive functioning, and psychological distress are evaluated by the HIT-6 questions. It offers a thorough analysis of the detrimental headache impact [29]. The HIT-6 has been extensively utilised in clinical practise for patient screening and treatment monitoring of headaches, including migraine. The six items were picked out of a total of 89, which included 54 items selected from an existing pool of negative headache impact items and 35 suggestions made by doctors [30].

The Migraine Disability Assessment (MIDAS) questionnaire, the three month, self-administered questionnaire assesses the level of headache-related impairment [31]. The MIDAS score is determined by three factors from five questions on disabilities: The number of days missed or significantly limited from activity in school or paid work activities is determined in the first and second questions (the school/job dimension); the number of days missed or significantly limited in housework activities is determined in the third and fourth questions (the housework dimension) [32].

Interventions

The present study can help to understand, how adolescents deal with chronic headaches in their daily lives. The findings will be helpful when physiotherapists encounter these patients in clinical practise and are able to give knowledgeable recommendations on coping mechanisms. The information that has come to light may help with a more thorough strategy and more suited therapy alternatives for these patients. Additionally, the study adds scientifically to understand the chronic pain in teenagers and advances the ability to comprehend and assist them. Eye motions are intricate and include the coordinated movement of the two eyes to focus an object on a corresponding retinal point. In addition, they can be used to converge on an item quickly or to follow or track an object of interest. These are accomplished by coordinated muscular contraction and relaxation controlled by the higher control centres [33]. The eyes move constantly throughout the day and less often at night. The bulbo-motor muscles are continually and maximally stretched while doing ocular workouts, which significantly raises the metabolic requirement (oxygen consumption) of muscular tissues [34]. When performing eye exercises, EOMs (skeletal muscles) undergo both, concentric contraction (shortening) and eccentric contraction (lengthening), which are referred to as, isotonic/dynamic strength training [35].

Exercises using eye movements included conjugated horizontal and vertical eye movements. For a period of 12 weeks, participants performed a 5 minute eye movement exercise, 30 minutes before breakfast and 30 minutes before bed [36]. The 15 eye exercises included conjugated horizontal and vertical eye motions. A 15-round motions of the left hand index finger in the horizontal visual area, before repeating the process in the vertical visual field, while maintaining a forward-facing fixed head and carefully controlling the eyes to follow the finger [33,37].

The head was moved horizontally (30 rounds laterally) and then vertically (30 rounds up and down) with fixed eyes on a fixed index

finger in the visual field, rather than moving the index finger in the visual field,

- Adduction: Looking inwards
- Abduction: Looking outwards
- Elevation: Looking upwards
- Depression: Looking downwards
- Incycloduction: Superior pole rotating towards the nose
- Excycloduction: Superior pole rotating away from the nose
- Dextroversion: Looking to the right
- Laevoversion: Looking to the left
- Dextroelevation: Elevation: Looking up and to the right
- Laeoelevation: Looking up and to the left
- Dextrodepression: Looking down and to the right
- Laevodepression: Looking down and to the left

This all eye/ocular movement should performed by patients [33]. A total of 20 repetitions are performed for each eye movement [37,38]. The following list of eye movements includes palming, blinking, sideways, front, and sideways viewing, rotating, up and down looking, and preliminary nose-tip staring. Following the eye exercises, the participants relaxed their eyes for 20 minutes by practising shavasana (corpse posture). A scientific basis for the yoga eye exercise is as follows: front and sideways gazing enhances the coordination of the medial and lateral muscles; rotating viewing restores equilibrium to the muscles, that surround the equator. Sideways seeing relieves the stress of muscles strained by prolonged reading and close work, preventing and curing squint [37,39].

DISCUSSION

Headaches are one of the most common complaints experienced, and they have been identified as a major contributor to poor academic performance and poor quality of life in people [1]. It is estimated that 11% of people worldwide, suffers from migraine, while 78% experience TTH [10,40]. Constant muscular contractions are linked to TTH risk factors. Various psychological factors may trigger these spasms, including prolonged head bending downward, easy access to technology, and teen health concerns [41]. An analysis of a study indicated that, teenagers are increasingly using the internet

due to the ease of access provided by mobile devices [42]. A mild to severe headache ranging from a few minutes to several weeks is characterised by mild to severe head discomfort. It is usually bilateral, pressing or tightening in nature, and does not become more severe with regular exercise. TTH is distinguished by its absence of systemic symptoms such as nausea, vomiting, photophobia, and phonophobia, which are present in other headache forms such as migraine. In light of this, TTH is sometimes referred to as a "featureless" headache [43]. The use of eye exercises is a safe and effective method of treating TTH, providing immediate, simple, and risk-free symptom relief. There are several pharmacological and non pharmacological therapies available, including physiotherapy and lifestyle changes that will allow you to resume your daily activities with little discomfort. Physiotherapy rehabilitation and acupuncture therapy, utilise a variety of techniques and modalities, including exercises, electrical stimulation, massage, joint mobilisation, and trigger-point therapy [44,45].

According to research by Aicher B et al., various headache patients receiving physiotherapy, experienced less pain [28]. However, the severity and duration of episodes remained mostly unchanged despite the lower frequency. Ocular exercises are crucial to reducing the severity of TTH [37]. These exercises target the stress related factors, that lead to TTH. In addition to affecting a person's ability to work, headaches can negatively impact their personal lives. Furthermore, headaches are associated with sleep disorders, which inturn, reduce the quality of life, in addition to disrupting daily routines and significantly affecting a person's psychosocial well-being [46].

Eye exercises are proven to be effective in treating primary headaches (tension-type). The mind is relaxed when it concentrates on one particular subject. As a result of the present experiment, a strong foundation has been laid for further investigation. This suggests that, eye exercises may be a practical and safe method of treating headaches, a growing public health problem. In light of the fact that, recent genetic and imaging studies have linked migraine with the cerebellum, which is essential for the control of eye movements. Therefore, it is particularly surprising that, no more research is there on eye movements in migraine [47]. Studies from the literature, where ocular exercises have been shown effective, tabulated in [Table/Fig-2] [35-37,39,48,49].

S. No.	Author name and year	Place of the study	Title	No. of sample size	Result
1.	Rahimi MD et al., 2023 [37]	United Kingdom	Effectiveness of eye movement exercise and diaphragmatic breathing with jogging in reducing migraine symptoms: A preliminary, randomised comparison trial.	Participants were randomly assigned to one of the study groups to perform either 12 consecutive weeks receiving, treatment as usual, TAU (n=22).	The primary outcome showed a significant decrease in the frequency, duration and intensity of migraine attacks among the interventions and measurement times.
2.	Senthil K and John B, 2022 [35]	Tamil Nadu, India	Yoga based ocular exercise (trataka): The scriptural and scientific review.	-	Studies has shown that, eye exercises can help with health problems.
3.	Kim SD, 2016 [39]	Korea	Effects of yogic eye exercises on eye fatigue in undergraduate nursing students.	The subjects of this study were 30 healthy females and 10 healthy males, undergraduate nursing students aged 20-23 years with no medical eye diseases, no history of applying eye medications, and no experience with yoga exercises.	There were no significant differences in the pre-intervention eye fatigue scores between the two groups. After the course of yoga exercises, the eye fatigue scores differed significantly between the 2 groups (yoga group vs. control group).
4.	Medendorp WP et al., 2002 [48]	Netherland	Human gaze stabilisation during active head translations.	Six male subjects, between 20 to 29 years of age, gave informed consent to participate in the experiments.	The results shows that, distance compensation was better for a visual target than for remembered targets in darkness, and behaved according to low-pass characteristics in both target conditions.
5.	Brad R, 2015 [36]	United States	A 17-year-old female with chronic daily headaches and migraines.	A 17-year-old female.	Following gaze stability exercises, the patient no longer had a consistent headache.

6.	Gopinathan G et al., 2012 [49]	Gujarat, India	A clinical study to evaluate the efficacy of trataka yoga kriya and eye exercises (non pharmacological methods) in the management of timira (ametropia and presbyopia).	A total of 66 patients (132 eyes) were recruited for the study.	There was a moderate improvement in clarity of vision, contrast sensitivity, and fineness of objects.
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[Table/Fig-2]: Review of literature of previous studies conducted on TTH [35-37,39,48,49].

TAU: Tubulin associated unit

CONCLUSION(S)

Certain successful trials have shown that, patients with TTH shows greater recovery when given physiotherapy. Tension-type headache is not observed in too much extent in individuals, who regularly do the prescribed ocular exercises, in comparison to those, who are not aware of the role of physiotherapy rehabilitation in reducing the intensity of TTH. Further research can be done for eyeball exercises and not only for TTH. It can be used in other conditions, mostly caused due to unwanted stresses. Eventhough, the present investigation only discovered a tiny number of low quality trials, its results suggest that, eye movements can successfully reduce primary headache symptoms. Moving your eyes may relieve headaches. More rigorous methodological and high quality RCTs are needed to test the hypothesis that, eye movements reduce headaches, as well as, to validate and better understand the effects of organised exercise programmes on headaches. In terms of pain frequency, severity, disability, overall impact, quality of life, and cranio-cervical range of motion, manual treatment is beneficial for adults with TTH. Combining different strategies appears to be the most successful strategy; none of the techniques were shown to be better than the others.

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