

# POSTTRAUMATIC HEADACHE PATHOPHYSIOLOGICAL MECHANISMS: A SYSTEMATIC LITERATURE REVIEW

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**Introduction.** Posttraumatic headache (PTH) is defined as a headache attributed to trauma, or injury to the head and/or neck. Acute PTH develops within 7 days after a traumatic brain injury (TBI), whereas persistent PTH lasts longer than 3 months. Clinically, PTH may resemble migraine or tension-type headache, while other forms include occipital neuralgia, cluster headache, low cerebrospinal fluid pressure headache, supraorbital/intraorbital headache, cervicogenic headache and headache associated with whiplash injuries. Posttraumatic hematomas may also cause headache. The aim of this study was to highlight the pathophysiological mechanisms underlying posttraumatic headache.

**Material and methods.** A literature review was performed using PubMed, ResearchGate, Google Scholar, medRxiv, EMBASE, and Cochrane library databases. The search term ‘posttraumatic headache’ was used, and 21 eligible studies were included in the analysis.

**Results.** PTH is associated with complex neurochemical and structural changes, including the release of excitatory neurotransmitters such as aspartate, glutamate, and acetylcholine. Elevated levels of brain-derived neurotrophic factor (BDNF) have been reported during PTH episodes. Neuroimaging studies suggest diminished choline concentrations in white matter, and decreased cortical thickness in bilateral frontal regions. Traumatic injury could impair descending inhibitory pain pathways. Pre-existing headache may be magnified following trauma. Discontinuation of the medication, regaining the consciousness after a TBI, and the head injury itself are the triggers for PTH. The locus coeruleus and periaqueductal gray matter play key roles in afferent pain modulation, and their involvement may explain the frequent association between PTH and post-traumatic stress disorder (PTSD). Gender differences in the incidence of PTH are controversial, although there is a higher incidence of migraine-like PTH in male veterans, and for tension-type PTH in elderly women. Genetic predisposition has been suggested, with FMH1 and ATP1A2 gene variants associated with increased PTH severity. Loss of consciousness is indicative of a more severe PTH. The treatment strategies for each PTH are similar to the preceding, although there is debate that PTH could be completely distinct and require alternative clinical approaches.

**Conclusions.** Posttraumatic headache is an important entity that needs to be expected, clinically classified, and that requires pathophysiology-based management.

**Keywords:** Post-Traumatic Headache, Migraine Disorders, Tension-Type Headache