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Pathophysiology Of Migraine

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ABSTRACT: Migraine continues to rank as the second leading cause of disability globally. Diagnosing migraine largely relies on a patient's medical history, though physical exams may sometimes be used to exclude other potential conditions. Migraines are generally categorized by whether or not they are accompanied by aura, and the number of headache days per month helps to differentiate between episodic and chronic migraine. Effective management often involves both acute treatments to address immediate symptoms and preventive therapies to reduce the frequency of future episodes. This review draws on recent data to offer a thorough understanding of migraine..

***Key words*:** Migraine, Headache, Chronic Migraine, Stress, Treatment.

Introduction:

A migraine headache is a recurring, intense throbbing pain that is often accompanied by symptoms such as nausea and visual disturbances. Although typically affecting one side of the head, migraines can sometimes impact both sides, a condition known as bitemporal migraine. The pain usually comes on suddenly and can last from several hours to a few days, with extended periods of relief between episodes. Some individuals may experience a sensation called an aura before the headache begins, which involves neurological symptoms affecting sensory, motor, or visual functions.

Migraines can start at any age but are most common between ages 10 and 30. Women are more prone to migraines than men, and they frequently begin in girls around the time of their first menstruation. Hormonal shifts that girls experience during puberty and continue throughout life are believed to be significant triggers for migraine attacks.[1]

Migraine, a significantly disabling primary headache disorder, affects roughly 15% of the general population each year.[2]

Over time, our knowledge of migraine has advanced considerably, largely thanks to developments in basic science and imaging studies. These advancements have clarified the complex mechanisms responsible for the diverse symptoms of migraines. Interestingly, pain is not always the most troubling symptom for all patients[3]

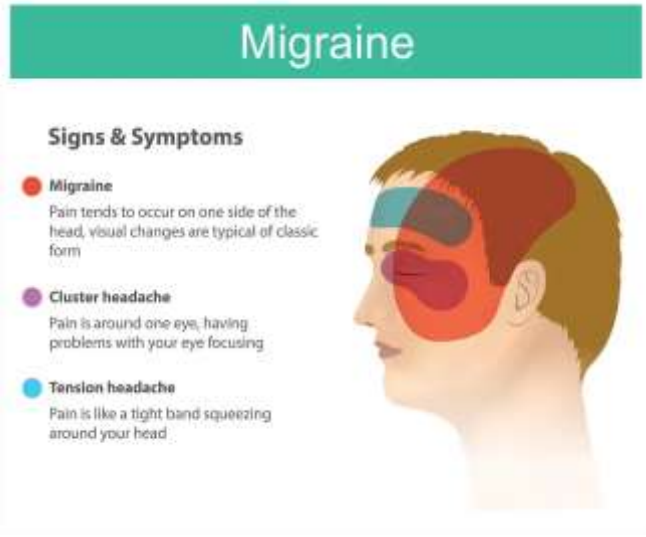


Fig.1.sign&symptom of migrane

▪ Objectives:

- Evaluate Effective Methods for Diagnosing Migraine HeadachesReview appropriate evaluation of a migraine headache.
- Examine the Causes of Migraine Headaches, Related Medical Conditions, and Potential Emergencies
- Outline Available Treatment Options for Migraine Management.
- Discuss Strategies for Interprofessional Teams to Improve Coordination and Communication in Migraine Care.

Migraine definition:

- Migraine is a hereditary, episodic sensory processing disorder, characterized by a variety of symptoms, with headache being the main one. A migraine attack typically unfolds in four overlapping stages, which can last anywhere from four to seventy-two hours. [4,5]

Etiology and Triggers:

The precise cause of migraines is not fully understood, but there is a genetic component, with twin studies showing that 35 to 50 percent of migraine risk is hereditary. Topical treatments are generally more effective for migraines with aura than for those without. Migraines can also be triggered by a variety of environmental, psychological, dietary, and physical factors.

Migraine attacks in individuals who are prone to them can be triggered by various factors, such as stress, exposure to loud noises or bright lights, strong smells, certain drinks, hunger, dehydration, alcohol consumption, lack of sleep or jet lag, changes in weather, and hormonal shifts (especially those related to female hormones). Additionally, certain foods like caffeine, chocolate, and red wine (which contains high levels of tyramine), as well as medications like reserpine and fenfluramine, can provoke migraines by increasing the release of serotonin (5-HT) [1]

- Stress: 80% (likely contributor)
- Hormonal fluctuations: 65% (commonly occur during menstruation, ovulation, and pregnancy; likely contributor)
- Skipping meals: 57% (likely contributor)
- Weather changes: 53% (likely contributor)
- Sleep disturbances (too much or too little): 50% (potential contributor)

- Strong odors: 40% (e.g., perfumes, colognes, petroleum products)
- Neck pain: 38%
- Alcohol intake: 38% (wine is a likely contributor)
- Smoking: 36% (unproven contributor)
- Late-night sleep: 32%
- Heat exposure: 30%
- Certain foods: 27% (aspartame is a potential contributor, while tyramine and chocolate are unproven)
- Exercise: 22%
- Bright lights: 38% (likely contributor) [7].

- **Type of migraine:**

1. Abdominal migraine
2. Hemiplegic migraine
3. Retinal migraine
4. Tension headache
5. Menstrual migraine
6. Medication overuse headache
7. Chronic daily headaches
8. Thunderclap headache
9. Sinus headaches [9]

1). Abdominal migraine: Abdominal migraine is a fairly common condition, affecting approximately 4 out of every 100 children, and it can also occur in adults. While children often outgrow abdominal migraines as they mature, many later develop migraine headaches. There is limited understanding of abdominal migraines in adults**.**

Symptoms:

- Frequent bouts of moderate to intense stomach pain lasting anywhere from 2 to 72 hours
- Nausea and vomiting occurring during these episodes
- No headache present during the attacks
- Feeling completely normal between episodes

Treatment for abdominal migraine:

When diagnosing abdominal migraine, it is essential for the doctor to gather a thorough medical history and conduct a physical exam to exclude or confirm other possible conditions.

Treatment generally follows the approach used for other types of migraines, although options for children are more limited. It typically includes acute treatments, such as pain relievers, and preventive strategies to reduce both the frequency and intensity of the attacks.

As with other forms of migraine, identifying and managing triggers can be helpful. Reducing exposure to these triggers may contribute to fewer attacks [9].

2).Hemiplegic migraine:

A rare type of migraine involving temporary weakness on one side of the body.

Symptom:

- Visual disturbances – changes in vision in both eyes, such as seeing colored spots, zig-zags, or flashes of light
- Speech problems – slurring words or struggling to speak clearly
- Communication issues – difficulty with writing and comprehending language, impacting reading, listening, speaking, and writing skills

People may also experience:

- Dizziness or vertigo – a sensation of spinning or unsteady movement
- Hearing problems – such as ringing in the ears (tinnitus)
- Confusion – difficulty in thinking clearly or focusing

Diagnosing hemiplegic migraine:

If you show symptoms of either type of hemiplegic migraine, it's essential to receive a proper diagnosis. Specialist medical consultation may be needed to assess the sudden appearance of one-sided weakness or numbness. Diagnosing SHM (Spontaneous Hemiplegic Migraine) and FHM (Familial Hemiplegic Migraine) requires a thorough evaluation of your symptoms, along with a detailed family history.

Treatment options for hemiplegic migraine:

If hemiplegic migraine is suspected, consulting a specialist is essential to ensure the correct treatment is chosen. For example, triptans are usually not recommended during the aura phase of SHM or FHM, and a specialist should evaluate whether it is safe to use them during the headache phase.

Similar to other types of migraine, there is no single "best" treatment. A specialist will evaluate your medical history, symptoms, and clinical experience to recommend preventive treatments, such as flunarizine (which is not widely available in the UK), topiramate, or other alternatives [10].

3)Menstrual migraine:

Migraines are more prevalent in women than in men, and hormonal fluctuations throughout a woman's life are known to be linked to migraine attacks. More than half of women with migraines identify menstruation (their period) as a trigger for their episodes..

Symptoms:

- Menstrual migraine refers to migraines that are associated with menstruation and occur during your period.
- These migraines are typically more severe, less responsive to treatment, and may last longer than other types of migraines.
- While most women experience migraines at other times during the month, it's estimated that fewer than one in ten women have "pure menstrual migraine," meaning they only experience migraines during their period and not at other times.

Causes of menstrual migraine:

Migraines are linked to a drop in estrogen levels. The natural decrease in estrogen that occurs before menstruation is connected to menstrual migraines. Women with heavy and painful periods often have elevated levels of prostaglandins (another hormone), which are also believed to play a role in triggering menstrual migraines.

Treatment:

Treatment options for menstrual migraines vary depending on factors like the regularity of your menstrual cycle, the presence of painful or heavy periods, menopausal symptoms, and whether you require contraception. For those with regular periods, your doctor may recommend taking medication a few days before and after your period starts, typically two days before and up to three days after bleeding begins.

Several treatment options are available, and your doctor will suggest the one best suited to your needs. These may include non-steroidal anti-inflammatory drugs (NSAIDs) such as naproxen, or medications like Frovatriptan (2.5 mg twice daily, taken on days when migraines are expected, generally from two days before until three days after menstruation starts) or Zolmitriptan (2.5 mg, taken twice or three times daily during the expected migraine period, typically from two days before until three days after the start of bleeding) [11].

Risk factors for migraine disease progression:

Various factors have been linked to the progression from episodic migraine (EM) to chronic migraine (CM) or chronic daily headache (CDH) [12]. Additionally, factors related to the onset of medication overuse headache (MOH) have also been identified [13]. The evidence supporting these factors varies in strength, which could be attributed to differences in study methodology, design, and sample size rather than the actual strength of the associations. Other limitations include the inability to establish causality in cross-sectional studies and the potential for additional risk factors that have yet to be discovered or thoroughly studied. The main factors identified in this review were categorized into five broad areas: (1) characteristics of migraine disease (such as frequency and associated symptoms), (2) treatment-related factors, (3) comorbidities, (4) lifestyle/external factors, and (5) demographic factors [14].

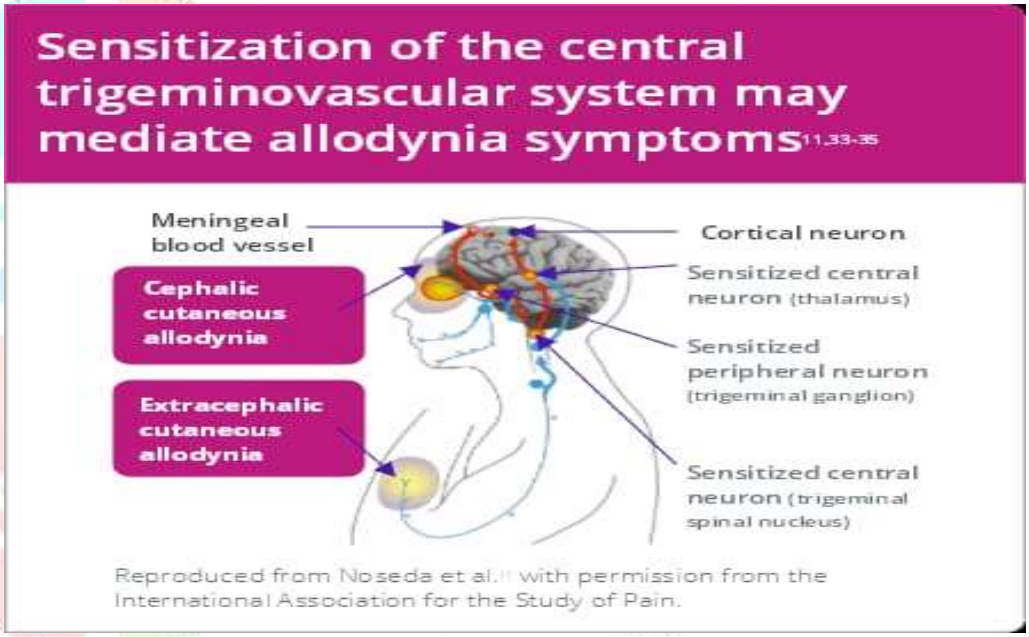
Lifestyle and exogenous factors:

Lifestyle and external factors, such as stressful experiences, negative childhood events, poor nutrition, insufficient sleep, and lack of exercise, can trigger or predispose individuals to migraine attacks. Repeated exposure to these factors may also contribute to the progression of migraine disease[15]. Stressful events, including major life changes, childhood trauma, everyday pressures, and financial difficulties, can affect the onset of chronic headaches. The community-based Frequent Headache Epidemiology Study examined the link between six types of significant life events or changes—such as those related to work, relationships, children, housing, death, and other personal factors like finances, illness, and abuse—and the development of chronic daily headaches (CDH) [16].

The studies revealed a dose-response relationship, with an increased number of abuse types correlating with a higher likelihood of developing migraines. The AMPP study found that individuals who experienced any form of maltreatment had more migraine headache days (MHDs) compared to those with tension-type headaches [17]. These findings are further supported by recent cross-sectional studies showing that past abuse is linked to an increase in hypersensitivity symptoms related to migraines [18].

- **Migraine functional anatomy and pathophysiology:**
- **The trigemino vascular system and brainstem nuclei:**

The trigeminovascular system is composed of peripheral axons from the trigeminal ganglion that supply the meninges and intracranial blood vessels, and centrally converge in the trigeminocervical complex (TCC), which includes the spinal trigeminal nucleus caudalis and the upper cervical spinal cord [19,20]. Second-order neurons from the TCC ascend to thalamocortical neurons, which then transmit signals to critical brain regions in the diencephalon and brainstem, such as the locus coeruleus (LC), periaqueductal gray (PAG), and hypothalamus. [21,22] .Calcitonin gene-related peptide (CGRP) is widely expressed in both peripheral and central neurons and has strong vasodilatory effects. It also exerts regulatory influence on second- and third-order neurons, which contributes to its role in modulating central pain processes. Elevated CGRP levels in individuals with migraines have been linked to a reduction in descending inhibitory mechanisms, potentially leading to heightened migraine susceptibility by sensitizing various central neural circuits [23]. While research has consistently demonstrated early brainstem involvement during the nociceptive phase of migraines, it is becoming clearer that the initiation of a migraine is associated with dysfunction in more central brain areas, such as the hypothalamus, potentially in response to both intrinsic brain dysfunction and external factors [24].



Conclusion: Migraine is a mental illness resulting from increased sensory intensity due to activation o f cortical and subcortical networks. Migraine attacks are progressive and often associated with aura, hea dache and sequelae; visual, auditory and speech symptoms (aura phase) are seen in approximately one th ird of patients. The prodromal phase appears to involve the hypothalamus and its functional connections with specific brain nuclei and cortical areas, while migraine is associated with a focus on peripheral and central trigeminal vascular pathways.

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