

Migraine and its Management

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Abstract

Migraine is a chronic neurological disorder characterized by recurrent episodes of moderate to severe headaches often in association with a number of autonomic nervous system symptoms, most often unilateral. Worldwide, migraines affect nearly 15% or approximately one billion people. Migraine is caused by the activation of a mechanism deep in the brain that leads to release of pain-producing inflammatory substances around the nerves and blood vessels of the head. Typically the headache is unilateral (affecting one half of the head) and pulsating in nature, lasting from 2 to 72 hours. The Etiology of migraine are, Calcitonin gene related peptides (CGRPs), Genetic, Triggers, Physiological aspects, Dietary aspects, Environmental aspects. Migraines typically present with self-limited, recurrent severe headache associated with autonomic symptoms. There are four possible phases to a migraine, although not all the phases are necessarily experienced 1) Prodrome phase (Early warning signs), 2) Aura phase, 3) Pain Phase (Attack phase: The headache begins), 4) Postdrome. Prevention & management through medication, includes NSAID's, Triptans, Ergotamines, Botox Injections, ACE Inhibitors, Angiotensin-Receptor Blockers, Histamine and Beta Blockers. Studies have showed mixed results on the benefits of acupuncture for preventing migraine. Herbs & Supplements treatment includes, *Butterbur (Petasites hybridus)*, *Feverfew*, *Riboflavin (Vitamin B2)* and *Magnesium*, *Fish Oil*, *Ginger* etc. Other treatments include spinal manipulation/ Chiropractic manipulation, relaxation techniques combined with applying a cold compress, Cognitive-behavioral therapy, laughter therapy, Yoga Nasal sprays and powders, Intra-oral appliances Biofeedback, Transcranial magnetic stimulation, Vagus Nerve Stimulation, Occipital nerve stimulation, Arterial surgery, Muscle Surgery: Trigger site release, Septoplasty and Turbinectomy, Decompression of certain nerves around the head and neck and Patent foramen ovale closure.

Keywords: Migraine; Migraine prevention and management.

Introduction

Migraine is a chronic neurological disorder characterized by recurrent episodes of moderate to severe headaches often in association with a number of autonomic nervous system symptoms, most often unilateral and in some cases associated with visual or sensory symptoms – collectively

known as an aura-that arise most often before the head pain but that may occur during or afterward.[1,2]

The word "Migraine" is derived from the Greek "pain on one side of the head." [1] Migraine is caused by the activation of a mechanism deep in the brain that leads to release of pain-producing inflammatory substances around the nerves and blood vessels of the head.[3] Typically the headache is unilateral (affecting one half of the head) and pulsating in nature, lasting from 2 to 72 hours. Associated symptoms may include nausea, vomiting, photophobia (increased sensitivity to light), phonophobia (increased sensitivity to sound) and the pain is generally aggravated by physical activity.[1]

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Incidence

Worldwide, migraines affect nearly 15% or approximately one billion people. Migraines most commonly start between 15 and 24 years of age and occur most frequently in those 35 to 45 years of age. In children, about 1.7% of 7 year olds and 3.9% of those between 7 and 15 years have migraines, with the condition being slightly more common in boys before puberty. During adolescence migraines becomes more common among women.[3] Migraine is most common in women and has a strong genetic component.[1] Depression is three times more common in people with migraine or severe headaches than in healthy individuals. Most often begins at puberty and most affects those aged between 35 and 45 years.[1] It is now ranked by the World Health Organization as number 19 among all diseases world-wide causing disability.[4]

Etiology

1. *Calcitonin gene related peptides (CGRPs)* have been found to play a role in the pathogenesis of the pain associated with migraine.
2. *Genetic:* Studies of twins indicate a 34 to 51% genetic influence of likelihood to develop migraine headaches. [1]Migraine has a strong genetic component. Approximately 70% of migraine patients have a first-degree relative with a history of migraine. The risk of migraine is increased 4-fold in relatives of people who have migraine with aura.[2]
3. *Triggers:* Different people respond to different triggers. Common migraine triggers include: emotional stress, intense physical exertion, abrupt weather changes, bright or flickering lights, high altitude, travel motion, lack of sleep, skipping meals, odors, certain foods and beverages (aged cheese, chocolate, red wine, beer, coffee, and many others).[5]
4. *Physiological aspects:* Migraines are more likely to occur around menstruation. Other hormonal influences, such as menarche, oral contraceptive use,

pregnancy, perimenopause, and menopause, also play a role.

5. *Dietary aspects:* Monosodium glutamate (MSG) is frequently reported as a dietary trigger (meat, poultry, dairy products etc.)
6. *Environmental aspects:* A change of weather or barometric pressure can prompt a migraine.[6] The indoor and outdoor environment overall of poor quality air quality and lighting triggers migraine.[1]

Following are the major migraine causes:

1. Stress and over burdening of mind.
2. Tensions
3. Acidity, Indigestion or Constipation
4. Excessive smoking and taking of alcohol
5. Low blood sugar, low blood pressure
6. General body weakness
7. Menstruation in women
8. Nutritional deficiency
9. Consistent overwork
10. Improper sleep and rest.[7]

Signs & Symptoms

Migraines typically present with self-limited, recurrent severe headache associated with autonomic symptoms. The severity of the pain, duration of the headache, and frequency of attacks is variable. A migraine lasting longer than 72 hours is termed status migrainosus. There are four possible phases to a migraine, although not all the phases are necessarily experienced.

Prodrome phase (Early warning signs)

The prodrome, which occurs hours or days before the headache. The symptoms may include a wide variety of phenomena, including: altered mood, irritability, depression or euphoria, fatigue, craving for certain food, stiff muscles (especially in the neck), constipation or diarrhea, and sensitivity to smells or noise. Either unusually energetic and

excitable or depressed, Sleepy, with frequent yawning.[1,8]

Aura phase

An aura is a transient focal neurological phenomenon that occurs before or during the headache. They appear gradually over a number of minutes and generally last fewer than 60 minutes. Symptoms can be visual, sensory or motor in nature and many people experience more than one. Vision disturbances often consist of a scintillating scotoma (an area of partial alteration in the field of vision which flickers). Sensory auras are the second most common type, Often a feeling of pins-and-needles begins on one side in the hand and arm and spreads to the nose-mouth area on the same side, Numbness usually occurs after the tingling has passed with a loss of position sense. Other symptoms of the aura phase can include: speech or language disturbances, world spinning, and less commonly motor problems.

Pain Phase (Attack phase: The headache begins)

Classically the headache is unilateral, throbbing, and moderate to severe in intensity. It usually comes on gradually and is aggravated by physical activity. Bilateral pain is particularly common in those who have migraines without an aura. Less commonly pain may occur primarily in the back or top of the head. The pain usually lasts 4 to 72 hours in adults, however in young children frequently lasts less than 1 hour. The pain is frequently accompanied by nausea, vomiting, sensitivity to light, sensitivity to sound, sensitivity to smells, fatigue and irritability. Other symptoms may include: blurred vision, nasal stuffiness, diarrhea, frequent urination, pallor, or sweating. Swelling or tenderness of the scalp may occur as can neck stiffness.[1]

Postdrome

The effects of migraine may persist for some days after the main headache has ended; this is called the migraine postdrome. A sore feeling

in the area where the migraine was, impaired thinking for a few days after the headache has passed, feeling tired or "hung over" and have head pain, cognitive difficulties, gastrointestinal symptoms, mood changes, and weakness, extreme tiredness, sluggishness, confusion head pain that flares up when lean over, move quickly, or experience a rush of blood to the head are the various signs and symptoms reported at this phase.[1,8]

Prevention & Management

1. Medication

- a. *NSAID's*: Aspirin, or nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen (Advil, Motrin IB, others), may help relieve mild migraines. Pain relievers, such as acetaminophen (Tylenol, others), also may help relieve mild migraines in some people. Drugs marketed specifically for migraines, such as the combination of acetaminophen, aspirin and caffeine (Excedrin Migraine), also may ease moderate migraine pain.[1,6]
- b. *Triptans*: Triptans work by promoting constriction of blood vessels and blocking pain pathways in the brain. Triptans effectively relieve the pain and other symptoms that are associated with migraines. Medications include sumatriptan (Imitrex), rizatriptan (Maxalt), almotriptan (Axert), naratriptan (Amerge), zolmitriptan (Zomig), frovatriptan (Frova) and eletriptan (Relpax). Some triptans are available as nasal sprays and injections, in addition to tablets.
- c. *Ergotamines*: Ergots seem most effective in those whose pain lasts for more than 48 hours. Dihydroergotamine (D.H.E. 45, Migranal) is an ergot derivative that is more effective. It's available as a nasal spray and in injection form.[6]
- d. *Botox Injections*: Onabotulinumtoxin A (Botox) is now approved for preventing chronic migraine in adults. Botox is given

by multiple injections to the head and neck area about every 12 weeks. These injections may help to dull future headache symptoms. Botox appears to work best for chronic migraines.

- e. *ACE Inhibitors:* Commonly used for treating high blood pressure, angiotensin converting enzyme (ACE) inhibitors such as lisinopril (Prinivil, generic) block the production of the protein angiotensin, which constricts blood vessels and may be involved in migraine.
 - f. *Angiotensin-Receptor Blockers:* Angiotensin-receptor blockers (ARBs), such as candesartan (Atacand), are another type of high blood pressure medications being studied for migraine prevention.
 - g. *Histamine:* Subcutaneous (under the skin) injections of histamine may be helpful for migraine prevention.
 - h. *Beta Blockers:* Beta blockers are usually prescribed to reduce high blood pressure. Some beta blockers are also useful in reducing the frequency of migraine attacks and their severity when they occur. Propranolol (Inderal, generic) and timolol (Blocadren) are approved specifically for prevention of migraine. Metoprolol (Lopressor, generic) is also recommended and atenolol (Tenormin, generic), and nadolol (Corgard, generic) may also be considered for migraine prevention.
2. *Acupuncture:* Acupuncture is a Chinese medicine technique that uses thin needles to stimulate specific points aligned with energy pathways in the body. Studies have showed mixed results on the benefits of acupuncture for preventing migraine.
 3. *Herbs & Supplements*
 - a. *Butterbur (Petasites hybridus):* Butterbur is a traditional herbal remedy used for many types of ailments, including

migraine. American Academy of Neurology considers butterbur “effective” and recommends it be offered for migraine prevention.

- b. *Feverfew:* The AAN ranks feverfew as “probably effective” and recommends that it be considered for migraine prevention.
 - c. *Riboflavin (Vitamin B2) and Magnesium:* Riboflavin and magnesium are the two vitamin and mineral supplements ranked by the AAN as “probably effective”. Magnesium helps relax blood vessels.
 - d. *Fish Oil:* Some studies suggest that omega-3 fatty acids, which are found in fish oil, have anti-inflammatory and nerve protecting actions. These fatty acids can be found in oily fish, such as salmon, mackerel, or sardines.
 - e. *Ginger:* Some people have reported less pain and frequency of migraines while taking ginger, and children can take it without danger. Ginger is also a popular home remedy for relieving nausea.[5]
4. *Chiropractic manipulation:* Chiropractic treatments usually involve spinal manipulation. The manipulation can range from massage and slow pressing to a quick thrust. Some chiropractors use heat, electrical stimulation, or ultrasound to help relax your muscles before doing a spinal adjustment.[1] Research shows that spinal manipulation may be an effective treatment option for tension headaches like migraine. In this type of treatment the spinal manipulation or chiropractic adjustments to improve spinal function and alleviate the stress on body system is performed.[9]
 5. *Massage and relaxation:* Relaxation therapy techniques include relaxation response, progressive muscle relaxation, visualization, and deep breathing. Muscle relaxation techniques are simple and easy to learn, and can be effective.

Some patients may also find that relaxation techniques combined with applying a cold compress to the forehead may help provide some pain relief during attacks.

6. *Cognitive Behavioral Therapy*: Cognitive-behavioral therapy (CBT) teaches patients how to recognize and cope with stressors in their life. It can help patients understand how their thoughts and behavior patterns may affect their symptoms, and how to change the way the body responds to anticipated pain.[5]
7. *Laughter Therapy*: Laughter is an audible expression, or appearance of merriment or happiness, or inward feelings of joy and pleasure. The benefits of laughter therapy include that, it stimulates the brain, nervous respiratory, hormonal and muscular system, sense well being and refresh, reduce stress, natural pain killer by increasing the levels of endorphins (white cells) in our body.[10]
8. *Yoga*: Daily yoga practice with a proper balanced diet helps a person to face the stressful situations by: increasing the threshold of tolerance: physical, mental and emotional by meditative practices, stabilizing the mind and balancing the emotions, gaining art of relaxation by mastering the technique of conscious differential relaxation.[11]
9. *Devices and surgery*
 - a. *Nasal Devices*: New types of nasal sprays and powders are being researched. Some of them use capsaicin, the chemical found in cayenne peppers, to help relieve pain.[5]
 - b. *Intra-oral appliances*: Intra-oral appliances are designed to relax the pericranial muscles, which have been reported to be tender in 100% of migraine sufferers during an attack. They have been reported to be effective in many migraine sufferers.[12]
 - c. *Biofeedback*: Biofeedback to induce muscle relaxation is widely used in migraine prevention.[13] Many studies have demonstrated that biofeedback is effective for reducing migraine headache frequency. Biofeedback training teaches the patient to monitor and modify physical responses, such as muscle tension, using special instruments for feedback.
 - d. *Neurostimulators*: Researchers are investigating a transcranial magnetic stimulation (TMS) device to help stop migraines before they occur. The hair dryer-size device is held to the back of the head and delivers quick magnetic pulses. The device is used when a patient experiences the first signs of a migraine. Other types of nerve stimulation devices are also under investigation.[5]
 - e. *Vagus nerve stimulation (VNS)*: Vagus nerve stimulation is a procedure that stimulates the vagus nerve with electrical impulses. With vagus nerve stimulation, a device is surgically implanted under the skin on chest. A wire is threaded under skin connecting the device to the left vagus nerve. When activated, the device sends electrical signals along the vagus nerve to brainstem, which then sends signals to certain areas in brain.[14] Series published in the literature suggest a beneficial effect of VNS in the treatment of migraine.[13]
 - f. *Occipital nerve stimulation (ONS)*: Published reports from open-label studies have demonstrated possible efficacy of ONS in a variety of primary headache disorders, including chronic migraine. ONS is typically performed with the equipment normally used for spinal cord stimulation (SCS), which includes electrodes and their leads, anchors to fasten the leads to connective tissue, and the implantable pulse generator (IPG). Electrodes are placed subcutaneously

- (under the skin) superficial to the cervical muscle fascia, transverse to the affected occipital nerve trunk at the level of C1, usually using fluoroscopic guidance.
- g. *Arterial surgery*: In patients where the pain has been positively diagnosed to originate from the scalp arteries (the terminal branches of the external carotid artery), the preventive treatment of choice is surgical cauterization of the responsible arteries (terminal branches of the external carotid artery, the superficial temporal artery and its frontal branch, and the occipital artery, the maxillary, posterior auricular, supra-orbital, and supra-trochlear branches) known as the Shevel Procedure.
- h. *Muscle Surgery: Trigger site release: Forehead migraine headaches*: In the glabellar area the supra-orbital and supratrochlear nerves are skeletonized by resecting the corrugator and depressor supercilii muscle using an endoscopic approach. *Temporal migraine headaches*: The temporal area, where the zygomaticotemporal branch of trigeminal nerve passes through the temporalis muscle, is addressed using a similar endoscopic approach but involves removing a segment of the nerve rather than transecting the muscle. *Occipital migraine headaches*: The posterior neck area where the greater occipital nerve passes through the semispinalis capitis muscle is addressed with an open surgical approach with resection of a small segment of the semispinalis muscle and shielding the nerves with a subcutaneous adipose flap.
- i. *Septoplasty and Turbinectomy*: A further trigger point, not involving muscles, has been identified in the nose of patients who have significant nasal septum deviation with enlargement of the turbinates. The nasal trigger points where enlarged turbinates are in contact with the nasal septum are addressed with a septoplasty and a turbinectomy.[12]
- j. *Decompression of certain nerves around the head and neck*: Migraine surgery which involves decompression of certain nerves around the head and neck may be an option in certain people who do not improve with medications.[15]
- k. *Patent foramen ovale closure*: A catheter is advanced up to the hole in the heart after it is inserted in a vein in the leg. Through the catheter, a device is then placed which blocks the hole between the left and right atria of the heart.[12]

Conclusion

Migraine does not have any permanent cure for itself. Many times it does not receive proper attention, is not diagnosed properly and thus remains under-treated. Numerous interventions can provide a good life to people who suffer from migraine. The triggering factors, changes in the blood vessel and nerve inflammation along with pain receive an individual but harsh treatment. However, there are plenty of relatively simple remedies that can be done at home which may lessen or completely remove your migraine onslaughts.

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