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Vestibular Migraine in Adolescents

Anisha Vyawahare [a*#] and Swarupa Chakole [b†]

[a] Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Wardha, India.
[b] Department of Community Medicine, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Wardha, India.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Migraine is a recurrent throbbing headache that affects one side of the head and is usually related to nausea and decreased vision. Migraine is typically seen in adolescents due to increased use of electronic devices and computers. It is a non communicable disease.10 percent patients with migraine suffer from vestibular migraine. Vertigo in children can lead to migraine and continue in adults too. Preventing the vertigo attacks in children and adolescents can help in the treatment of migraine. Behavioural therapy is an important factor in treatment of migraine in this age. 40% of migraine patients have some associated vestibular symptoms which includes dizziness and disturbed balance. An elevated comorbidity of migraine and vertigo was discovered in several patient categories and later verified at the community level, far exceeding what random chance would predict. Vertigo is substantially more commonly seen in migraine sufferers, particularly those with aura, than in headache-free controls. Migraine is one of the most disturbing diseases in USA, is nearly as common as hypertension and more common than asthma and diabetes. Migraine and vestibular symptoms can coexist with inner ear disorders. It is a difficult condition to diagnose and treat. Multiple temporal patterns are responsible for this. The most common cause of vertigo in children is vestibular migraine (VM). Clinical findings and laboratory test results have been found in a sample of children and adolescents suffering from Vestibular migraine. Recent classification criteria for dizzy children are discussed and their limitations. Migraine is typically seen in adolescents due to increased use of electronic devices and computers. It is a non-communicable disease. 10 percent patients with migraine suffer from vestibular migraine.

[#]3rd year MBBS student,
[†] Professor,
**Corresponding author: E-mail: anishavyawahare3@gmail.com;*

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1. INTRODUCTION

In clinical neurology, vertigo and headache are some of the most common complaints. At least, 35-50 percent of migraine patients report experiencing dizziness because of their migraine [1,2]. Vestibular migraine, migrainous vertigo, migraine-associated vertigo, and vertiginous migraine are the most prevalent terminology for combining vestibular symptoms with migraine. In addition to common migraine symptoms, including headache, patients with this sickness have vertigo, dizziness, or balance issues [3]. Although comprehensive research on the link between vertigo and migraine has not done, vertigo as a symptom of migraine has been known since the eighteenth century [4]. However, systematic research on the connection between vertigo and migraine did not begin until a century later. This article attempts to review a plethora of literature on vestibular migraine and related topics. Vertigo may occur before or after the attack of migraine. Dizziness and vertigo is seen with each episode of headache in less than 25 percent of the cases.

It is seen that the incidence of migraine is increasing in adolescents and young adults. This leads to increase in migraine-related vertigo, i.e., vestibular migraine. This rise can be connected to increased use of mobile phones, computers, laptops and other electronics in those age groups. The triggers for vestibular migraine are mostly same to that of triggers of classic migraine, which include menstruation, insomnia, stress, nutrition, and changes in the weather. The triggers vary from person to person and each trigger applies only for certain percent of patients.

Vertigo as a symptom of migraine has been known since the nineteenth century, although systematic research on the link between vertigo and migraine did not begin until a century later. This article attempts to make a review of a plethora of literature on vestibular migraine and related topics. Management of patients with vestibular migraine depends on effective counselling, reducing the triggers, pharmacotherapy, physical therapy, and minimizing comorbidities. The first and the most logical line of treatment for any migraine should always be to avoid the triggers. The majority of medical and therapeutic treatment for vestibular migraine is quite the same to that of classical migraine.

Management of patients with vestibular migraine depends on effective counseling, reducing the triggers, pharmacotherapy, physical therapy, and minimizing comorbidities. The first and the most logical line of treatment for any migraine should always be to avoid the triggers.

2. EPIDEMIOLOGY

Epidemiologic research provides the scientific foundation for our present understanding of vestibular migraine. The interrelationship between vertigo and migraine is complicated. To begin with, migraine and vertigo are both common problems in the population, and they may occur in the same patient by chance. Migraine prevalence has been generally steady among industrialized countries, ranging from 6 to 8 percent in males and from 16 to 25 percent in females [5-7]. Women were about three times more likely to be affected than men [7]. Dizziness, on the other hand, a broad word that includes vertigo and vestibular symptoms, has been identified as one of the most prevalent patient complaints in medicine, affecting 20-35 percent of the population. In people aged 18 to 79, the lifetime prevalence of vertigo was around 5%, with a significant female preponderance [8]. As a result, it's vital to insist on confirmation of a causal link between vestibular symptoms and migraines that goes beyond coincidence. Men had a 93 percent, an 8 percent, and a 69 percent prevalence of headache, migraine, and tension-type headache, respectively, while women had a 99 percent, a 25 percent, and an 88 percent prevalence of headache, migraine, and tension-type headache, respectively. Men had a headache prevalence of 11%, while women had a headache prevalence of 22%. Migraines affected 6% of men and 15% of women in the previous year, while tension-type headaches affected 63 and 86 percent of men and women, respectively. There were significant gender disparities in migraine, with a male-to-female ratio of 1:4 and 4:5 in tension-type headache. Tension headache prevalence declined with age within the age range investigated, although migraine prevalence did not.. Migraine is typically seen now in adolescents due to increased use of electronic devices and computers. It is a non communicable disease.10 percent patients with migraine suffer from vestibular migraine. Vertigo

in children can lead to migraine and continue in adults too. Preventing the vertigo attacks in children and adolescents can help in the treatment of migraine. Behavioural therapy is an important factor in treatment of migraine in this age. Only ten to thirty percent of patients describe a classic vestibular aura lasting from 5-60 minutes .Vertigo may occur during before or after the attack of migraine. Dizziness and vertigo is seen with each episode of headache in less than 25 percent of the cases.

An elevated comorbidity of migraine and vertigo was discovered in several patient categories and later verified at the community level, far exceeding what random chance would predict. Vertigo is substantially seen in migraine sufferers, particularly those having aura, than in headache-free controls [1]. Furthermore, several vertigo syndromes, such as benign paroxysmal positional vertigo, Meniere's disease, and motion sickness, have been associated to migraine in epidemiological research. The prevalence of migraine in people with idiopathic migraine is shown to be greater than in the general population. (nine, ten). According to the prevalences of migraine (16%) and vertigo (7%), 1 percent of the general population is expected to suffer from migraine and vertigo. However, the real comorbidity rate in Germany was 3.2 percent, according to the German National Health Survey [9]. This reveals that there is a strong link between migraine and vertigo. The lifetime prevalence of vestibular migraine in the general population was found to be percent, with a one-year prevalence of 0.8 percent [10]. Vestibular migraine generally presents at an older age but can be present at any age. With a gender ratio between 1.5 and 5 to 1, women are affected more commonly than men [3]. Studies also suggest familial clustering and autosomal-dominant trait with less presentation in males [11].

3. PATHOPHYSIOLOGY

There is no known pathogenesis for vestibular migraine. Interictal eye movement abnormalities and observations made during episodes are suggestive of migraine being related to central and peripheral vestibular diseases. The series of event vestibular migraine remains largely unknown. However, according to some studies, the neuroanatomical connections to and from central vestibular structures, as well as neurochemical regulation through the locus coeruleus and raphe nuclei, could all play a role [12]. When compared to healthy control people, a few experimental studies found robust connectivity and enhanced signal transmission between vestibular and nociceptive systems in vestibular migraine patients. In these patients, Cerebral hyperexcitability and central sensitization of the trigeminal system have a particularly negative impact on the vestibular system [13]. Many studies have also proposed an observation that even vestibular systems of migraine sufferers may be hyperexcitable [14,15] And Neurotransmitters like serotonin, norepinephrine, and dopamine can cause vestibular migraine by regulating the activity of central and peripheral vestibular neurons. This has yet to be demonstrated in humans [16].

Certain factors like constriction of cerebral vessels, decreased serotonin levels , dopamine can be related to the pathogenesis of migraine.

Genes for familial hemiplegic migraine:

- FHM1- CACNA1A: Neuronal P/Q calcium channel – increases neurotransmitter release
- FHM2- ATP1A2: Astrocyte sodium pump – dysfunction increases extracellular potassium
- FHM3 – SCN1A: Neuronal sodium channel – increased action potential firing

Different theories for the pathogenesis of migraine are as follows:

- Vascular theory – constriction of intracerebral blood vessels may produce aura. Vasodilation of intra or extracranial vessels cause headache
- Serotonin theory – Decreased serotonin levels can be connected to migraine and specific receptors for serotonin found in blood vessels of brain
- Neurogenic theory-A cortical depression wave of neuronal repolarization travelling anteriorly across the cerebral cortex from the occipital region, followed by depressed activity spreading slowly anteriorly across the cerebral cortex, is thought to be the cause of the aura. This spreading process occurs at a rate of 3 millimetres per minute. Dysfunction of activation of cells in the trigeminal nucleus releases vasoactive neuropeptides by activated trigeminovascular neurons. They produce painful meningeal inflammation and vasodilation.

- Dopamine has a role, and dopaminergic stimulation can cause most migraine symptoms. Migraine patients have dopamine receptor hypersensitivity.

4. CLINICAL FEATURES

Menstruation, insomnia, stress, nutrition, and changes in the weather are all common causes for vestibular migraine, as are menstruation, insomnia, stress, and variations in the weather. The triggers differ from one individual to the next, and each trigger only affects a small percentage of patients.The most common vertigo symptoms in persons with vestibular migraine were on its rotatory vertigo (67 percent) and positional vertigo (47 percent), according to a large population-based study (24 percent). [11]. A boost in sensitivity to motion, particularly head motions, was also seen, with symptoms resembling motion sickness (balance disturbance, illusion of motion, and nausea) [17]. Visual vertigo is a condition that worsens when you look at fast-moving things [18]. Attacks can last anywhere from a few seconds (for 10% of patients) to a few minutes (30%), hours (30%), or even days (for 30% of patients) (30 percent). thirty percent of the patients [10] and even days (30 percent of patients) [3]. Only ten to thirty percent of patients describe a classic vestibular aura lasting from 5-60 minutes [19]. Vertigo may occur during before or after the attack of migraine. Dizziness and vertigo is seen with each episode of headache in less than 25 percent of the cases [12]. Vestibular migraine is also often accompanied by photophobia (fear of light), phonophobia (fear of sound), osmophobia (intolerance to odors) and other visual or other auras and these symptoms are present and important as they are the sole relation between migraine and attacks of vertigo [3] and Hearing loss and tinnitus though not often seen in the patients of migraine can also be seen in some cases. The majority of hearing loss is minor and temporary [9]. Patients with vestibular migraine have a considerably higher rate of prevalence of mental comorbidity (65%), particularly anxiety and depressive disorders [20].

Vestibular migraine can resemble BPPV if the patient presents with purely positional vertigo. For differentiating BPPV from vertigo, direct nystagmus in the acute phase is required. Positional nystagmus is persistent in vestibular migraine, and is frequently of the central variety. With vestibular migraine, the symptomatic episodes are usually shorter and more frequent as compared to BPPV

4.1 Complications of Migraine

Red flags of headache –

- Worst headache ever
- First severe headache
- Acute worsening over days
- Altered level of consciousness
- Abnormal neurologic examination
- Significant weight loss
- Fever
- Pain on bending, lifting, coughing

Mnemonic SNNOOP-

- Systemic symptoms including fever
- Neoplasm
- Neurological degeneration
- Onset acute
- Old age
- Pattern change

5. DIFFERENTIAL DIAGNOSIS

Other conditions which cause spontaneous and positional vertigo are included the differential diagnosis of vestibular migraine. Taking an elaborate history provides more useful insights than technical investigations, which just serve to add to or refute a clinical diagnosis.

1. Menière's disease -Because of the comparable clinical manifestations, it is the most essential differential diagnosis for vestibular migraine. According to studies, migraine is seen in roughly 56 percent of patients with Meniere's illness, but only 24 percent of healthy people. (22). The cause of the relationship between vestibular migraine and Menière's illness is unknown. It might be difficult to distinguish between vestibular migraine and Menière's illness in the first year after symptoms appear since Menière's disease can be monosymptomatic, with vestibular symptoms appearing only in the early stages [21]. Low-frequency sensorineural hearing loss is often the most dependable symptom of Menière's disease [3].
2. Benign paroxysmal positional vertigo - BPPV can be noticed as the most common cause of recurrent vertigo [22]. Vestibular migraine can resemble BPPV if the patient

presents with purely positional vertigo. For differentiating BPPV from vertigo, direct nystagmus in the acute phase is required. Positional nystagmus is persistent in vestibular migraine, and is frequently of the central variety [23]. With vestibular migraine, the symptomatic episodes are usually shorter and more frequent as compared to BPPV [24].

3. Transient ischemia of posterior circulation (TIA) – It is a syndrome in which ischaemia takes place . Ischaemia is due to stenosis, thrombosis or embolism of the posterior arteries which includes vertebral arteries of neck, posterior cerebral artery and basilar arteries .
4. Syncope – It is due to itregular blood flow to the brain. It results in loss of consciousness.

Vestibular paroxysmia, transient ischaemic attacks, episodic ataxia and psychiatric dizziness syndromes are some other conditions that can be included in differential diagnoses of vestibular migraine [25].

6. TREATMENT AND MANAGEMENT

Management of patients with vestibular migraine depends on effective counselling, reducing the triggers, pharmacotherapy, physical therapy, and minimization of comorbidities. The first and the most logical line of treatment for any migraine should always be to avoid the triggers. The majority of medical and therapeutic therapy options for vestibular migraine are identical to these as classical migraine and With the exception of an inconclusive study of zolmitriptan as an abortive medication, no substantial randomised control-based therapeutic studies for vestibular migraine have been done, despite the availability of diagnosis criteria [3,9]. Several studies demonstrate that the medications used for migraine prevention are also beneficial for migraine prophylaxis [26]. Beta blockers like metoprolol and propranol antidepressants like amitriptyline are used. Calcium channel blockers like verapamil , anticonvulsant like valproate and lamotrigine [27-32]. Physical therapy and vestibular rehabilitation have been found to enhance balance in patients with vestibular migraine [32-34]. For prophylaxis of migraine a pnemonic of *ABCD* is used:

A – Anticonvulsants: valproate, lamotrigine
B – Beta blockers: propranolol , metoprolol
C– Calcium channel blockers: verapamil, nifedipine
D – Anti-depressants: amitriptyline

In a recent study of Cochrane, for use of Anticonvulsants medicine in prophylaxis of migraine, valproate, and topiramate were better than placebo. Acetazolamide, gabapentin, lamotrigine, clonazepam were of no use in migraine. No difference was to be found in between patients experiencing or not experiencing aura [35-38].

7. DISCUSSION

It is seen that the incidence of migraine is increasing in adolescents and young adults. This leads to increase in migraine related vertigo, i e, vestibular migraine. This rise can be connected to increased use of mobile phones, computers, laptops and other electronics in those age groups.

Because vestibular function clinical tests are frequently normal or hard to interpret according to conflicting results from earlier investigations, diagnosis of vestibular migraine is now made only depending on the clinical symptoms. The most common vestibular symptoms and their clinical manifestations in vestibular migraine, as well as contemporary features of its clinical diagnosis and evaluation, are discussed in this article.

8. CONCLUSION

Vestibular migraine is an illness that has a major impact on those who suffer from it, with vertigo and migraine symptoms lasting anywhere from 5 minutes to 72 hours. Inner ear difficulties can be caused by migraines. In the management of patients with vestibular migraine, effective counselling, reducing triggers, medication, physical therapy, and minimising comorbidities are all critical. The first and most rational course of therapy for any migraine should always be to avoid the triggers.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Vuković V, Plavec D, Galinović I, Lovrenčić- Huzjan A, Budišić M, Demarin V. Prevalence of vertigo, dizziness and migrainous vertigo in patients with migraine. Headache: The Journal of Head and Face Pain. 2007;47(10):1427-35.
2. Cha YH, Lee H, Santell LS, Baloh RW. Association of benign recurrent vertigo and migraine in 208 patients. Cephalalgia. 2009;29(5):550-5.
3. Stolte B, Holle D, Naegel S, Diener HC, Obermann M. Vestibular migraine. Cephalalgia. 2015;35(3):262-70.
4. Lipton RB, Stewart WF, Diamond S, Diamond ML, Reed M. Prevalence and burden of migraine in the United States: data from the American Migraine Study II. Headache: The Journal of Head and Face Pain. 2001;41(7):646-57.
5. Breslau N, Davis GC, Andreski P. Migraine, psychiatric disorders, and suicide attempts: an epidemiologic study of young adults. Psychiatry research. 1991;37(1):11-23.
6. Rasmussen BK, Jensen R, Schroll M, Olesen J. Epidemiology of headache in a general population—a prevalence study. Journal of clinical epidemiology. 1991;44 (11):1147-57.
7. Neuhauser HK, Radtke A, Von Brevern M, Lezius F, Feldmann M, Lempert T. Burden of dizziness and vertigo in the community. Archives of internal medicine. 2008; 168(19):2118-24.
8. Lee H, Il Sohn S, Kyo Jung D, Won Cho Y, Geung Lim J, Doe Yi S, Yi HA. Migraine and isolated recurrent vertigo of unknown cause. Neurological research. 2002; 24(7):663-5.
9. Neuhauser HK, Radtke A, Von Brevern M, Feldmann M, Lezius F, Ziese T, Lempert T. Migrainous vertigo: prevalence and impact on quality of life. Neurology. 2006;67(6):1028-33.
10. Oh AK, Lee H, Jen JC, Corona S, Jacobson KM, Baloh RW. Familial benign recurrent vertigo. American journal of medical genetics. 2001;100(4):287-91.
11. Furman JM, Marcus DA, Balaban CD. Vestibular migraine: clinical aspects and pathophysiology. The Lancet Neurology. 2013;12(7):706-15.
12. Marano E, Marcelli V, Stasio ED, Bonuso S, Vacca G, Manganelli F, Marciano E, Perretti A. Trigeminal stimulation elicits a peripheral vestibular imbalance in migraine patients. Headache: the Journal of Head and Face Pain. 2005;45(4):325-31.
13. Lewis RF, Priesol AJ, Nicoucar K, Lim K, Merfeld DM. Dynamic tilt thresholds are reduced in vestibular migraine. Journal of Vestibular Research. 2011;21(6):323-30.
14. Lewis RF, Priesol AJ, Nicoucar K, Lim K, Merfeld DM. Abnormal motion perception in vestibular migraine. The Laryngoscope. 2011;121(5):1124.
15. Cass SP, Ankerstjerne JK, Yetiser S, Furman JM, Balaban C, Aydogan B. Migraine-related vestibulopathy. Annals of Otology, Rhinology & Laryngology. 1997 ;106(3):182-9.
16. Parashar M, Jain A. Formulation Development and Evaluation of Migraine Almotriptan Loaded Ethosomes Using Box Behnken Design, Journal of Pharmaceutical Research International,. 2021;33(54A):214-223.
DOI: 10.9734/jpri/2021/v33i54A33739.
17. Drummond PD. Triggers of motion sickness in migraine sufferers. Headache: The Journal of Head and Face Pain. 2005 Jun;45(6):653-6.
18. Dieterich M, Brandt T. Episodic vertigo related to migraine (90 cases): vestibular migraine?. Journal of neurology. 1999;246 (10):883-92.
19. Eckhardt-Henn A, Best C, Bense S, Breuer P, Diener G, Tschan R, Dieterich M. Psychiatric comorbidity in different organic vertigo syndromes. Journal of neurology. 2008;255(3):420-8.
20. Radtke A, Lempert T, Gresty MA, Brookes GB, Bronstein AM, Neuhauser H. Migraine and Meniere's disease: Is there a link?. Neurology. 2002;59(11):1700-4.
21. Furman JM, Cass SP. Benign paroxysmal positional vertigo. New England Journal of Medicine. 1999;341(21):1590-6.
22. Polensek SH, Tusa RJ. Nystagmus during attacks of vestibular migraine: an aid in diagnosis. Audiology and Neurotology. 2010;15(4):241-6.
23. Von Brevern M, Radtke A, Clarke AH, Lempert T. Migrainous vertigo presenting as episodic positional vertigo. Neurology. 2004;62(3):469-72.

24. Stolte B, Holle D, Naegel S, Diener HC, Obermann M. Vestibular migraine. Cephalalgia. 2015;35(3):262-70.
25. Allen MA. Thiemee Communication Science. Journal of Electronic Resources in Medical Libraries. 2017;14(1):23-6.
26. Power L, Shute W, McOwan B, Murray K, Szmulewicz D. Clinical characteristics and treatment choice in vestibular migraine. Journal of Clinical Neuroscience. 2018;52: 50-3.
27. Maione A. Migraine- related vertigo: Diagnostic criteria and prophylactic treatment. The Laryngoscope. 2006;116 (10):1782-6.
28. Bisdorff AR. Management of vestibular migraine. Therapeutic advances in neurological disorders. 2011;4(3):183-91.
29. Fotuhi M, Glaun B, Quan SY, Sofare T. Vestibular migraine: a critical review of treatment trials. Journal of neurology. 2009;256(5):711-6.
30. Bisdorff AR. Management of vestibular migraine. Therapeutic advances in neurological disorders. 2011;4(3):183-91.
31. Whitney SL, Wrisley DM, Brown KE, Furman JM. Physical therapy for migraine- related vestibulopathy and vestibular dysfunction with history of migraine. The Laryngoscope. 2000;110(9): 1528-34.
32. Ghogare AS, Patil PS. A cross-sectional study of co-morbid generalized anxiety disorder and major depressive disorder in patients with tension-type headaches attending a tertiary healthcare centre in central rural India. Nigerian Postgraduate Medical Journal. 2020;27(3):224. Available:https://doi.org/10.4103/npmj.npmj_23_20.
33. Jain S, Jungade S, Ranjan A, Singh P, Panicker A, Singh C, Bhalerao P. Revisiting Meniere's Disease" as "Cervicogenic Endolymphatic Hydrops" and Other Vestibular and Cervicogenic Vertigo as Spectrum of Same Disease: A Novel Concept. Indian Journal of Otolaryngology and Head & Neck Surgery. 2021;73(2):174-9. Available:https://doi.org/10.1007/s12070-020-01974-y.
34. Abbafati, Cristiana, Kaja M. Abbas, Mohammad Abbasi, Mitra Abbasifard, Mohsen Abbasi-Kangevari, Hedayat Abbastabar, Foad Abd-Allah, et al. "Five Insights from the Global Burden of Disease Study 2019." LANCET. 2020;396;10258: 1135–59.
35. Savundra PA, Carroll JD, Davies RA, Luxon LM. Migraine-associated vertigo. Cephalalgia. 1997;17(4):505-10.
36. Neuhauser H, Leopold M, Von Brevern M, Arnold G, Lempert T. The interrelations of migraine, vertigo, and migrainous vertigo. Neurology. 2001;56(4):436-41.
37. Lempert T, Olesen J, Furman J, Waterston J, Seemungal B, Carey J, Bisdorff A, Versino M, Evers S, Newman-Toker D. Vestibular migraine: diagnostic criteria. Journal of Vestibular Research. 2012; 22(4):167-72.
38. Abbafati, Cristiana, Kaja M. Abbas, Mohammad Abbasi, Mitra Abbasifard, Mohsen Abbasi-Kangevari, Hedayat Abbastabar, Foad Abd-Allah, et al. Global Burden of 369 Diseases and Injuries in 204 Countries and Territories, 1990-2019: A Systematic Analysis for the Global Burden of Disease Study 2019. LANCET. 2020;396:10258:1204–22.

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