

Blinded By Pain: The Hidden Dangers of Migraine on Eye Health

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Abstract:-Introduction: Migraine is a neurological disorder affecting a substantial global population pose a significant threat on vision. Beyond the characteristic debilitating headache, photophobia and sensitivity to sound, migraine impacts on the brain and nervous system influence on ocular health remains a lesser known aspect of the condition. Approximately one billion people live with migraine, it is the 3rd most common illness globally.

Methods: This article aims to shed light on the ways in which migraine can affect the eye scrutinizing the diverse ways in which the neurological disorder can influence the eye. It is a comprehensive review of existing research impact on eye and analysis data from studies on migraineurs eye health to identify trends. This review was conducted by a thorough search of academic resources such as Google Scholar, and PubMed, specific search terms like ‘Migraine’, ‘Migraineurs’, ‘Aura’, ‘Photophobia’, ‘Retina’, ‘Cornea’, ‘Glaucoma’.

Conclusion: 75% of migraineurs experience and suffer with eye related symptoms .This review found a significant association between migraine and eye condition such as Dry eye, retina damage. This review highlighted the need for increased awareness and education among the migraineurs and healthcare professionals about the potential risks on eye and importance of regular eye checkups. Migraine impact on eye structure is a complex and multifaceted. The exact mechanism underlying these is not yet understand but research reveals changes in corneal nerve fibers, retinal thickness and optic nerve. Individual with migraine should be aware of these potential affects safeguard their eye health.

Key words: Migraine, Migraineurs, Aura, Photophobia, Retina, Cornea, Glaucoma.

INTRODUCTION

Migraine is an episodic neurological disorder accompanied by headache and photophobia caused by abnormal brain activity that affects the nerve signals. Migraine is an imbalance between excitatory and inhibitory system the migraine control studies shown that elevated glutamine levels in thalamus that leads to increased regional excitability. In brain the visual thalamus and the LGN relays the visual information the retina to primarily visual cortex. Retina and cortical inputs are critical in processing visual information within LGN ⁽¹⁾. Hadjikhani et al says that Migraine effects on visual system have been noticed in the patient are photophobia, visual snow, palnopsia which last for 120 minutes to 72 hours aura. Migraine attacks 2 times in 60 days and 12 times per year. Migraine is affected by One billion individuals worldwide every year. Causes are hormonal imbalance, sleep pattern changes, foods and drinks, stress, perfumes and loud noise, smoking. Photophobia starts about 2,880 minutes before the migraine attack. Visual symptoms are Palinopsia (fig 1) persistent recurrence of a visual image, visual snow syndrome (fig 2) tiny flickering spots (black and white), Double vision and aura zig zag pattern, flashing lights are all the symptoms that appears in migraineurs ⁽¹⁾.



FIG 1. Palinopsia



FIG 2. Visual snow syndrome

The pathophysiology of migraine is incompletely understood, but evidence points to hyper-responsiveness of cortical neurons being a key feature. The basis of hyper-responsiveness is not clear, with an excitability imbalance potentially arising from either reduced inhibition or increased excitation. In Josephine Battista et al study they have measured centre-surround contrast suppression in people with migraine as a perceptual analogue of the interplay between inhibition and excitation in cortical areas responsible for vision. They predicted that reduced inhibitory function in migraine would reduce perceptual surround suppression. Recent models of neuronal surround suppression incorporate excitatory feedback that drives surround inhibition. Consequently, an increase in excitation predicts an increase in perceptual surround suppression⁽³⁾.

In this article we will explore the ways in which migraine can affect the eyes and what this means for individuals who suffer from this condition.

METHODS

A comprehensive literature search was conducted using major database, including PubMed and google relevant keywords and phrases, such as “migraine” and “visual impact”, effects on eye health and eye structures “cornea”, “retina” and risk of “dry eye syndrome” “glaucoma” “AMD” diseases. Relevant data was extracted from the selected review on 8 articles and summarize the findings. Studies published in English, peer review articles were only included in this review.

DISCUSSION

Visual cortex altered in migraine:

Functional neuroimaging studies have shown a dysfunction of the visual network in migraine, both with and without aura. These review have found increased activation in visual cortex areas, including the lingual gyrus, inferior parietal lobule, and inferior frontal gyrus. Additionally, decreased functional connectivity between the default mode network and the visual cortex has been reported. The findings of this review suggest that visual processing abnormalities are a common feature of migraine. Altered cortical excitability and inhibition may contribute to these abnormalities. The review findings suggest that visual cortical inhibition may not be significantly impaired in migraine. However, repeated visual auras may potentially affect visual cortical function. However, a trend was observed

towards slightly impaired performance on certain visual tasks in a subgroup of participants with a high frequency of visual aura. The distribution of the functional network along both the ventral and dorsal visual pathways differed between migraine patients and non-headache healthy control participants, providing evidence that the functional network was altered in migraine between headaches. The functional network was bilateral in the control participants but substantially lateralized in the migraine patients⁽²⁾.

In between migraines, when asymptomatic, visual surround suppression for drifting stimuli is greater in individuals with migraine than in controls. The data provides evidence for a behaviourally measurable imbalance in inhibitory and excitatory visual processes in migraine and is incompatible with a simple model of reduced cortical inhibitory function within the visual system. Migraine showed increased centre surround suppression for drifting stimuli, with a significant difference in perceived contrast between the migraine and control groups. The visual perception in people with migraine. The review found that individuals with migraine have increased centre-surround suppression for drifting visual stimuli, but not for static stimuli. This suggests that there may be abnormalities in visual processing in people with migraine, particularly in the dorsal visual pathway responsible for motion processing. The review findings have implications for our understanding of the neural mechanisms underlying migraine and may provide a useful tool for monitoring changes in visual processing in people with migraine⁽³⁾.

Corneal nerve fibre density:

Chronic migraineurs patients had lower NFD. Nerve fibre density reduced in migraineurs are seen that can lead to impaired corneal sensitivity which leads dry eye syndrome and ocular complications⁽⁴⁾.

Risk factor of vision loss:

While migraines can cause temporary visual disturbance, the risk of permanent vision loss is real. Review suggests that migraineurs are at increased risk of developing glaucoma, neurovascular age related macular degenerations.

1. Glaucoma

Migraineurs and glaucoma the impact of migraine on retinal thickness. The migraines did not

significantly increased the risk of glaucoma, they were associated with thinner retinal nerve fibre layer and central macular thickness. The review found that about 13% with migraines had found with glaucoma those with tension type headache⁽⁴⁾.

2. Neovascular Age related macular degeneration

The migraineurs had high risk of developing neovascular AMD compared with normal health individual without migraine, the exact mechanism underlying the link between migraine and neovascular AMD and unclear but endothelial dysfunction, inflammation, and oxidative stress⁽⁶⁾.

3. Retinal thickness

Key findings included increased thickness in the superior-outer sector of the inner nuclear layer (INL) in migraine patients. Additionally, the temporal-outer sector of the ganglion cell layer (GCL) and the superior-outer sector of the macular retinal nerve fiber layer (mRNFL) in headache-side eyes showed reduced thickness. The review also revealed a positive correlation between migraine severity and attack frequency. Notably, a negative correlation was found between migraine severity and INL thickness in headache-side eyes. These results suggest a potential link between migraine and retinal thickness changes, particularly in the INL and GCL layers⁽⁷⁾.

4. Dry eye syndrome

Dry eye and migraine are two common conditions, dry eye is characterized by lack of tear film, leading to eye discomfort, blurred vision & increased risk of infections. Migraine is a neurological disorder severe headache and sensitivity to light and sound. Review found that migraineurs are more likely to experience dry eye symptoms. Peripheral sensitization refers to the increase sensitivity of nerve endings in the eyes lead to dry eye. The migraineurs experience photophobia common symptom of keratoconjunctivitis sicca (dry eye)⁽⁷⁾.

Manage with migraine:

I. Regular eye check-up

Daily transportable trying out of imaginative and prescient enabled perception into perceptual overall performance within side the lead as much as migraine events, a time factor this is commonly tough to seize experimentally. Perceptual surround suppression of comparison fluctuates all through the migraine cycle, assisting the software of this degree as an indirect,

non-invasive assay of the stability among cortical inhibition and excitation⁽⁸⁾.

Regular eye assessments are important. They can assist stumble on eye troubles early. This is mainly genuine for humans with migraines or headaches. During those assessments, optometrists can pick out problems like eye strain, inflammation, glaucoma, and cornea-associated troubles.

II. Maintain a healthy lifestyle

Eating often at meal instances or having small common food during the day are related to much less common migraine headaches. Have a balanced meal with protein, carbohydrates, precise fats, fruits, vegetables, and keep hydration. Skipping food or extended durations of time among food might also additionally cause or purpose greater extreme migraine assaults because of starvation and coffee blood sugar levels.

III. Avoid visual triggers

strive slumbering or mendacity down in a darkish room in the course of a migraine drink lots of water to keep away from dehydration have a wholesome weight-reduction plan and devour food at ordinary times workout often and get lots of sleep attempt to maintain to a wholesome weight attempt to manipulate your strain levels keep away from matters you already know can cause migraines like caffeine and alcohol.

CONCLUSION

75% of migraineurs experience and go through with eye associated signs .The evaluation determined a sizeable affiliation among migraineurs eye circumstance i.e. Dry eye, retina damage, AMD. Eye associated signs effect of lifestyles in migraineurs. The evaluation highlighted the want for multiplied recognition and training a number of the migraineurs and healthcare specialists approximately the capacity dangers on eye and significance of ordinary eye check-up. Migraine effect on eye structure is a complicated and multifaceted. The precise mechanism underlying those isn't but apprehend however review revels modifications in corneal nerve fibres, retinal thickness and dry eye syndrome and found found that migraine is a risk factor for glaucoma,AMD. Individuals with migraine need to be vigilant about the symptoms so that they can protect their eye health with regular eye check-ups.

LIMITATIONS AND FUTURE SCOPE

As there are limited number of researches showing the exact reason behind these visual symptoms this review helps in bridging the gap. This needs a wide sample study to understand the exact mechanism underlying these symptoms.

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