

A Clinical Study of Ocular Causes of Headache in Patients Attending Tertiary Care Hospital

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Abstract:

Background: Awareness and understanding of the potential ocular aetiologies of headaches are becoming increasingly relevant and necessary. There is an array of diseases that present with headaches in ophthalmology clinics, placing the ophthalmologist at the forefront of their recognition and management. In this context, effort has been made in the present study to analyze the various ocular causes of headache and their distribution, periodicity and incidence.

Methods: This was a prospective study carried out from February 2021 to September 2022 (19 months) involving 100 patients presenting to the department of ophthalmology, Government General Hospital, Kakinada. All cases were examined in detail by taking a detailed history. A thorough systemic and local examination was done for all these patients. The ophthalmic examination included a detailed study of the globe and its adnexae.

Results: The maximum incidence of ocular causes of headaches was seen in the second, third, and fourth decades. In patients below 10 years and above 70 years, headaches due to ocular origin were only 3% and 1%, respectively. The incidence of ocular headache among females was higher (66%) when compared to males (34%). Ocular headaches were more frequent among the student group (34%), followed by housewives (32%) and unskilled workers (24%). The least incidence of ocular causes of headaches was observed in skilled workers and professionals, with both groups contributing about 5%. Eyestrain was the leading cause of headaches, which contributed to 78%, followed by raised IOP at 11%. Among the raised IOP, open-angle glaucoma cases were 6%, followed by lens-induced glaucoma in 3% and angle closure glaucoma in 2%.

Conclusion: The various ocular causes of headache and their characteristics were elucidated in the present study, emphasizing the need for detailed evaluation of patients with headaches in order to properly identify and treat the cause of headache.

Keywords: Ocular Causes, Headaches.

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Introduction

One of the most prevalent conditions in the world is "headache", sometimes referred to as cephalgia, which is defined as pain above the orbito-meatal line. This word is used to describe discomfort in the head that is accompanied by uncomfortable feelings in the cranial vault and pain in the face. Many people who come to the ophthalmology department with headaches think that ocular malfunctions or disorders are the common source of their symptoms. It is becoming more and more important to be aware of and comprehend the potential ocular causes of headaches. The Third Edition of the In-

ternational Classification of Headache Disorders (ICHD-3) issued provides four categories for "headache attributed to a problem with the eyes." The four categories include "headache attributed to ocular inflammatory disorder," "headache attributed to refractive error," and "headache attributed to acute angle-closure glaucoma." These ocular aetiologies can be difficult to discern for healthcare personnel who are not knowledgeable about ocular diseases and disorders.

In an ophthalmology clinic, a variety of disorders can manifest as headaches, and ophthalmologists

are at the forefront of identifying and treating these conditions. In light of this, an attempt has been made to examine the distribution, periodicity, and incidence of the various ocular causes of headache in the current study.

Materials & Methods

This prospective study, which lasted 19 months from February 2021 to September 2022, involved 100 patients who came to the Government General Hospital's ophthalmology department in Kakinada. Every case was thoroughly investigated by obtaining a thorough history. For each of these individuals, a comprehensive systemic and local examination was performed. Ophthalmic examination comprised careful analysis of the globe and its adnexae. The correct attention was given to the identification of glaucomas, heterophorias, heterotropias, convergence and accommodation anomalies, and refractive errors. The number of different headache-

causing disorders as well as their traits were counted and recorded for analysis.

Results

Demographic Characteristics

The second, third, and fourth decades showed the highest incidence of headaches caused by ocular factors. Only 3% and 1%, respectively, of patients under 10 years old and over 70 years old reported having a headache with an ocular origin.

Compared to men, who had a 34% incidence of ocular headache, women had a higher rate of 66%. Students experienced ocular headaches more frequently (34%), followed by housewives and unskilled workers (32% and 24%, respectively). Experts and professionals had the lowest incidence of ocular causes of headaches; each group contributed roughly 5% of the total.

Table 1: Incidence of Various Ocular Lesions Causing Headache

Ocular Cause	Number of Cases	Percentage
Eye strain	78	78%
Intra ocular inflammation	8	8%
Uveitis	5	5%
Corneal ulcer	3	3%
Raised IOP	11	11%
Open angle glaucoma	6	6%
Lens induced glaucoma	3	3%
Angle closure glaucoma	2	2%
Diseases of external eye and adnexae	3	3%

Table 1 illustrates that eyestrain accounted for 78% of headaches, with elevated IOP contributing 11%. Open-angle glaucoma accounted for 6% of cases with elevated IOP, followed by lens-induced glaucoma (3%), and angle closure glaucoma (2%). Headache-causing diseases of the external eye and

adnexae were extremely uncommon, occurring in only 3% of cases. Uveitis accounted for 5% of the 8% occurrences of intraocular inflammations, whereas corneal ulcers accounted for the remaining 3%. Diseases of the adnexae and external eye, primarily dacryocystitis, accounted for 3%.

Table 2: The Relative Incidence of Various Causes of Eyestrain in Ocular Headache

Causes of Eye Strain	No. of Cases	Percentage
Refractive errors	68	87%
Convergence insufficiency	11	14.1%
Accommodative insufficiency	26	33.3%
Heterophoria	2	2.56%
Heterotropia	2	2.56%

Refractive errors accounted for over 87% of the eye strain, with accommodative and convergence insufficiencies contributing roughly 33% and 14.1%, respectively. The incidence of heterotropia and heterophoria was rather low, at 2% each. (Table 2)

Table 3: Relative Incidence of Different Type of Refractive Errors Causing Ocular Headache

Type of Refractive Errors	No. of Cases	Percentage
1. Astigmatism	25	36.7%
2. Hypermetropia	23	33.8%
3. Myopia	20	29.4%

Astigmatism accounted for 36.7% of refractive errors and was the most common cause of ocular

headaches, followed by hypermetropia (33.8%) and myopia (29.5%). (Table 3)

Characteristics of Headache

In 76% of cases, the headaches had a subtle beginning. 10% had a sub-acute onset, compared to 14% who had an acute one. The headaches were sporadic in 74% of the research participants and constant in the remaining participants. Regarding diurnal fluctuation, the majority of people reported having

headaches 43% of the time in the evening, 37% in the morning, 13% at night, and 7% during the day.

69% of cases of headache with ocular aetiology were primarily in the periorbital area. About 32% of people had generalized pain, while 6% had occipital pain.

Table 4. Nature of Pain in Ocular Headache

Nature of Pain	No. of Cases	Percentage
Boring	22	22%
Burning	7	7%
Pressure	35	35%
Throbbing	23	23%
Vague	13	13%

As shown in Table 4, 35% of cases of ocular headaches were of the pressure kind. 23% felt it was a throbbing type, and 22% felt it was a dull type. In 64% of cases, provocative elements, including reading close to work, painting, and tailoring were present.

For 37% of respondents, rest and analgesics were alleviating factors, whereas for 22% of respondents, no single relieving factor could be expressed.

45%, 37%, and 44% of respondents reported experiencing pain, watering, or blurred vision, respectively.

Discussion

Headache, with or without ocular pain, is one of the most common symptoms that an ophthalmologist sees. As crucial as it is to treat the ailment with analgesics, it is just as crucial to determine which comorbidity is causing these individuals' headaches. Refractive mistakes and potentially fatal conditions such as intracranial space-occupying lesions are the main culprits. Therefore, research into the ocular origins of headaches is necessary in order to offer suitable treatments and avert potential problems.

According to Thomas et al., 21% of headache sufferers see an ophthalmologist, which is nearly the same as the percentage of patients (27%) who see a general practitioner. [1] According to Whittington, 45 percent of the more than 1400 consecutive patients who saw a refraction complained of headaches. [2] It has been reported by Al Wadaani FA et al. [3] that a clinical study on presbyopia and refractive errors in the university community revealed that people in their second and third decades experience a higher frequency of headaches as a result of eye issues, which is consistent with the findings of this study.

Due to puberty, it has been shown that the prevalence rate of headaches increases around the age of thirteen, especially in girls. Twenty percent of the patients in our study were of school-age. The

pressure to perform better academically at home and at school may be the cause of this age group's headaches. [4]

The neurotic personalities of women and excessive stress, both of which can cause headaches, may help to explain why the current study found a higher incidence of ocular headaches in females. In their study, Yared et al. [5] also noted that 45.8% of the participants were female.

In the non-presbyopic adult group, Hendricks et al. [6] found that headaches affected six out of ten patients, with females experiencing a prevalence greater than two times (2.33 fold) higher than males. The scientists came to the conclusion that the preponderance of women might be due to cultural factors and the effects of a culture where men predominate, which could cause psychological stress. [7]

In the current study, students made up approximately 34% of the study population, which is the majority. According to Al Wadaani FA et al. [3] students account for roughly 46% of refractive errors, which is consistent with our findings.

Eye strain was the primary factor in 78% of headaches. About 87% of cases of eye strain were attributed to refractive errors as the primary cause. Insufficiencies in terms of accommodation and convergence were observed in 33.3% and 14.1% of cases, respectively. The incidence of heterotropia and heterophoria was quite low.

In the Sanket Parajuli et al. study [8] eye strain was also a significant factor, as 34.5% of the 69 asthenopia patients also exhibited refractive error. 44% of refractive errors were found in a French study involving headache sufferers. [9]

In the Bombay Hospital, Sheerang B. Deshpande and R.K. Ghosh's study [10] on primary convergence insufficiency found that only around 7.7% had the condition, which is nearly identical to our findings.

The main cause of eye strain was hypermetropia, according to the Abraham et al. [11] study on accommodation and its relationship to refractive defects. Astigmatism, on the other hand, was the primary cause of eye strain in our study, with hypermetropia coming in second. According to a comparable study conducted in Nepal, 44% of the patients exhibited refractive defects, with astigmatism being more common (63.63%), followed by hyperopia (27.27%) and myopia (9.00%). [12]

In the Lajmi et al. [13] study, patients with HARE (Headache Associated with Refractive Errors) showed a correlation between the type and degree of refractive error they had and their headaches. Visual blur was more common in patients with mild astigmatism and anisometropia, or the difference in refractive error between the two eyes. Individuals with myopia or near sightedness contracted their scalp and periorbital muscles to squint and narrow the palpebral fissures, which in turn produced a pinhole effect. Patients with hyperopia or farsightedness sustained their accommodative effort.

It has been proposed that HARE is more severe in people with hyperopia than in those with myopia, and that it is also more severe in patients with higher levels of astigmatism and refractive error. [14] According to Gunes et al., astigmatism in particular and mild to moderate refractive error can also cause migraines.

Convergence insufficiency was the cause of 14.1% of eye strain cases in the current investigation. Previous research has shown wide variations in the prevalence of CI, ranging from 1.75 to 33.0%. [15]

According to Kratka & Kratka, the majority of CI patients were diagnosed between the ages of 20 and 40, and 75% of them had symptoms. [16] In the 1970s and 1980s, only 2.25-8.5% of school-age children assessed in elementary schools in North America were diagnosed with CI. [17,18] The authors proposed that throughout this historical era, adults worked closer to home than children did.

In comparison to the findings of Gupta et al. [19] in India (49%), Romania [20] (60.4%), and Patwardhan and Sharma [21] (71.4%) in India, the incidence of convergence insufficiency in the current study was lower. The patients' disparate employment settings could be the reason for these differences. Poor binocular condition is another possible cause of headaches mentioned by Gordon. [22]

In a sample of 50 patients who were referred for an eye examination, Cameron [23] estimated a low incidence of refractive errors-related headaches, and Jain et al. [24] in an observational study carried

out in India observed just 1.48% (of 202 patients) prevalence of refractive errors in headache patients.

Accommodative insufficiency accounted for 33% of the study's findings. The ability of the eye to adjust the crystalline lens's refractive power to focus images on the retina at various distances is known as accommodation. Reduced or subpar accommodation, or accommodating insufficiency (AI), has been connected to CI. [25]

According to Marran et al., 58% of kids with CI also had AI. [26] The authors proposed that by assessing accommodative amplitudes and a patient's near point of accommodation, eye care professionals can assess for concurrent AI in patients with CI.

Open-angle glaucoma accounted for 6% of cases with elevated IOP, lens-induced glaucoma for 3%, and angle closure glaucoma for 2%. Headache-causing diseases of the external eye and adnexae were extremely uncommon, occurring in only 3% of cases.

Uveitis accounted for 5% of the 8% occurrences of intraocular inflammations, whereas corneal ulcers accounted for the remaining 3%. Diseases of the adnexae and external eye, primarily dacryocystitis, accounted for 3%. 3.5% of patients in the Sanket Parajuli et al. study [8] had corneal ulcers in addition to other ocular causes of headaches. Among the patients, 0.5% had primary angle closure glaucoma, 1% had phacomorphic glaucoma, 0.5% had chronic angle closure, 6% had ocular hypertension, 4.5% had anterior uveitis, and 1% had posterior scleritis.

Kimbo et al. [9] in their study indicated that 12% of individuals with anterior segment diseases such as glaucoma and uveitis have headaches. Any ocular inflammatory condition as well as a sudden increase in intraocular pressure can cause headaches and pain in and around the eyes. [27] Disciform keratitis (6%), epithelial defect (0.5%), optic neuritis (1%), acute dacryocystitis (1%), herpes zoster ophthalmicus (0.5%), preseptal cellulitis (1%), and painful internal hordeolum (1%) were other causes that were observed in their investigation.

Characteristics of Headache

69% of cases of headache with ocular aetiology were primarily in the periorbital area. About 32% of people had generalised pain, while 6% had occipital pain. Similarly, a research by Sanket Parajuli [8] found that headaches most frequently occurred in the frontal region (36.5%), followed by the occipital region (30%). There were also reports of widespread headaches (14.5%), temporal headaches (7.5%), and hemicranial headaches (6%).

Headaches in the frontal and/or occipital regions are frequently linked to refractive problems. Asthenopia is defined as dull aching or boring discomfort that can be deep-seated or superficial, continuous or sporadic, particularly associated with using one's eyes and made worse by conditions like exhaustion or dim lighting. [28] Ocular discomfort is typically experienced with heated and puffy lids. There could be blurriness in your vision, especially up close.

The incidence of refractive errors in individuals with headaches was found to be 1.48% in observational research involving 202 patients in India. [29] In a research involving 1400 individuals scheduled for refraction, 45 percent of the participants reported having headaches. [30] Gordon et al. discovered that sensations of eyestrain and headache were frequently more common in mild refractive errors (particularly hyperopia) than in significant refractive errors. [31] From an ophthalmological standpoint, various ocular disorders like acute glaucoma, uveitis, optic neuritis, and visual anomalies like refractive errors and accommodative and vergence impairments in headaches play the most significant roles. [32]

Acute elevation in intraocular pressure is frequently associated with pain, but an eye with a similar pressure of slow onset may be asymptomatic. While acute angle-closure glaucoma is the most prevalent painful glaucoma, some kinds of secondary open- and closed-angle glaucoma are associated with acute pressure spikes and pain. [33]

In addition to the ocular morbidities taken into account in this study, other pathologies that are frequently observed to be associated with headache in ophthalmic practice include orbital wall fracture with extraocular muscle impingement, painful third nerve palsy, cavernous sinus thrombosis, papilledema, necrotizing or non-necrotising scleritis, and HZO (Herpes Zoster Ophthalmicus). Papilloedema frequently requires immediate neuroimaging in order to rule out haemorrhage, hydrocephalus, or tumours. Although the headache brought on by increased intracranial pressure doesn't have to be severe, it frequently occurs upon awakening and is associated with vomiting. The ophthalmologist should not consider this phenomenon innocuous, as chronic papilloedema may lead to blindness. [34]

Conclusion

The various ocular causes of headache and their characteristics were elucidated in the present study, emphasizing the need for detailed evaluation of patients with headaches in order to properly identify and treat the cause of headache.

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