

## A RETROSPECTIVE OBSERVATIONAL STUDY OF PREVALENCE AND OCULAR MANIFESTATIONS IN VARIOUS OCULAR CAUSES FOR HEADACHE DISORDERS

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### ABSTRACT

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#### BACKGROUND

Headache or cephalgia is one of the commonest symptoms causing pain in head above eyes or the ears, behind the head in the occipital region or in the back of the upper neck causing pain as well as disability to an individual.

WHO reports around 47% of adults worldwide will have experienced headache in the last year. Headache maybe primary or secondary. Tension headache is more common type of primary headache. Almost, 90% of adults have tension headache and it is more common in females than males. Migraine headache is third most prevalent disorder worldwide and ranked as seventh highest cause of disability. Migraine headaches are the second most common type of primary headaches, whereas cluster headache, a relatively uncommon type of primary headache affecting less than 1 in every 1000 adults.<sup>1</sup> Many people suffer from mixed headache disorder in which tension headache or secondary headache may trigger migraine.

Headache on 15 or more days in every month affects 1.7-4% of the world adult population. Hospital-based studies of migraine shows India is home over 16% of world inhabitants suffering from migraine.

#### MATERIALS AND METHODS

In our study, total screening of 1200 cases was done with headache symptomatology reported to Eye OPD directly as well as referred from ENT, Medical, NeuroMedical, Surgical, Neurosurgical, Psychiatry, Orthopaedics and Trauma Ward. A detailed clinical examination and ophthalmological examination was done in 1200 cases.

#### RESULTS

Sexual prevalence in our study indicated female with increased prevalence of 46.67% compared to male of 36%. Among 30 cases of migrainous headache with or without aura, the sexual prevalence in our study has female-to-male ratio as 2:1 (female - 20 cases and male - 10 cases). No cluster headache disorder was reported in our study. Among the tension headache presented with ocular manifestations like association of the refractive error, redness, burning sensation, the female prevalence among the adolescent group was noted. Among the study age group of 10-70 years, increased prevalence between 10-30 years age group was noted with 873 cases (72.75%). Among this age group, ocular causes for headache like uncorrected refractory errors like various types of astigmatism as well as hypermetropia with asthenopic symptoms were present. The total number of refractory error cases detected were 407 in number out of 560 cases of ocular causes of headache (72.68%). The overall percentage of refractory error cases among 1200 screening is 33.92%. Next to refractory error, dry eye detected cases were 110 out of 1200 (9.17%). Third increased prevalence case was muscular imbalance and convergence insufficiency with or without association of refractory errors with 95 cases (7.92%). Acute congestive stage of primary angle closure glaucoma and subacute angle closure glaucoma had 3 cases each as per our study.

#### CONCLUSION

The headache is multifactorial in origin and the ophthalmologist may play a vital role in establishing the final diagnosis of headache. The WHO reports around 47% of adults worldwide will have experienced headache within the last year. It is estimated that 50% of people experiencing headache self-treat rather than visiting a health care provider.

#### KEYWORDS

Headache, Migraine, Refractory Error, Tension Headache, Primary Headache Disorder, Secondary Headache Disorder, Cases.

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#### BACKGROUND

Headache or cephalgia is one of the commonest symptoms, which may be associated with primary or secondary headache disorders. Headache disorders are among the most common disorders of nervous system. Almost, half of the adult population would have suffered from headache once in a year. Headache disorders maybe acute or chronic and it is characterised by recurrent headache associated with social and personal burden of pain, disability and damaged quality of life.<sup>2</sup> The chronic headache disorders

may also predispose the individual to other illness like depression and anxiety occurring more common with migraine than in healthy individuals. Depression is more common in individuals with severe headache than in healthy people. Migraine, tension-type headache and medication overuse headache are of public health importance as they are responsible for high population level of ill health and disability.<sup>3</sup>

Primary headache disorder like migraine, tension headache, cluster headache, chronic daily headache syndrome are not associated with other diseases, but can cause substantial levels of disability. Primary headache per se is not an indicator of any particular disease entity. Headache maybe genetically predisposed with imbalance in the biochemical mediators in the body and due to the varying stress levels of the individuals in today's overworked schedules. The primary headache have distinct features like such as unusual duration or pain associated with a certain activity. Some people think that headache is caused by activation of sensory nerves, which release peptides such as serotonin causing inflammation in arteries, dura and meninges and also cause some vasodilatation. Triptans medication, which treat migraine block serotonin receptors and constrict blood vessels.

Tension-type headache with feeling of tight band around the head with a constant dull ache felt on both sides, pain spreading to or from the neck. Such headache normally develop slowly and gradually in the middle of the day, which maybe episodic or chronic. Episodic attacks are usually few hours in duration lasting for several hours to several days. In case of chronic, the headache occurs for 15 or more days a month for a period of at least 3 months.

Cluster headache, a relatively uncommon form of primary headache affecting less than 1 in every 1000 adults. The headache strike quickly once or more daily at the same time each day and often without warning lasting between 45-90 minutes persisting for duration of cluster period, normally 4-8 weeks. The pain is severe, sharp or burning and is usually located in or around one eye. The associated area may become red and swollen, eyelid may droop and the nasal passage on the affected side may become stuffy and running.

Many people suffer from mixed headache disorder in which tension headache or secondary headache may trigger migraine. Mean global prevalence is estimated at 14.7%.

Secondary headaches results from brain tumours, strokes, meningitis, subarachnoid haemorrhage, malignant hypertension, cerebral aneurysm and A-V malformation are the life threatening conditions to less serious conditions like withdrawal from caffeine and discontinuation of analgesic after prolonged use.

The large percentage of headache disorders (migraine, tension headache) among females are caused by fluctuating symptoms during menstrual cycle. This can occur prior to, during or even mid cycle menstruation. The increased male prevalence commonly occur with cluster headache.

Ocular causes for headache, refractory errors like uncorrected astigmatism and hypermetropia, muscular

imbalance with convergence insufficiency with or without association of refractory error, dry eyes for which factors like postmenopausal, very old age, chronic meibomitis/MGD (meibomian gland dysfunction), drug induced (propranolol, isotretinoin), rheumatoid arthritis, after cataract and pterygium surgeries, post herpes zoster keratitis, herpes simplex keratitis, interstitial keratitis, dacryoadenitis, sebaceous carcinoma of lid, erysipelas of lid, acute congestive stage of primary angle closure glaucoma and subacute angle closure glaucoma.<sup>4</sup>

In case of mixed headache disorders, primary headache disorders like tension headache and/or migraine along with ocular causes of headache will be present. The systemic diseases with ocular manifestations and ocular causes for headache association also will be present in mixed headache disorders. The example are multiple sclerosis with optic neuritis and headache, myasthenia gravis with ptosis and headache, sphenoidal sinusitis with optic neuritis and headache, toxemia of pregnancy with papilledema and headache, meningitis with optic neuritis, increased intracranial tension and headache, idiopathic intracranial hypertension, papilledema with headache and flu-like illness, watering photophobia with headache.

The primary headache disorders like migraine, cluster headache, ocular migraine, tension headache disorders also may present with various ocular manifestations like watering, photophobia, redness of the eyes, flashes of light, blind spot in field of vision, unusual sensitivity to light, scintillating scotoma, lid oedema and temporary visual loss and double vision. In our study, primary, secondary and mixed headache disorders were presented with various ocular manifestations.<sup>5</sup>

Global burden of disease study 2010 (GBD 2010) found Tension Type Headache (TTD) and migraine to be second and third most prevalent diseases worldwide.<sup>5</sup> Migraine headache lasting for few hours to 2-3 days cause pulsating, throbbing pain on one or both sides of the head accompanied by blurring of vision, lightheadedness, nausea and sensory disturbances with or without aura. Migraine headaches are the second most common types of primary headache and this is often misdiagnosed or undiagnosed as tension or sinus headache. Migraine is most affected between 35 and 45 years and is ranked as 7<sup>th</sup> highest cause of disability. General prevalence of migraine in preadolescent period were same for males and females whereas for postadolescent period, increased prevalence in females than males (2:1) because of hormonal influence.<sup>6</sup>

Headache is the most common symptom after a closed head injury, which can last for more than 2 months in 60% of affected individuals.<sup>7</sup> The patients with chronic posttraumatic headache unfortunately also have cognitive and behavioural problems and many drugs currently used to treat headache also have a negative effect on cognition.<sup>8</sup>

Half to three quarter of adults aged 18-65 years in the world have had headache in the last year and among those 35% more have reported migraine. 28 million people in United States have migrainous headache. According to

migraine trust, there are approximately 1 lakh migraine attacks in United States every day.

The common headache triggering agents to be recorded in headache diary. The pain scale from 0-10 recorded in various primary headache disorders. The 0 indicates no pain, 5 indicates moderate pain and 10 indicates worst pain imaginable. The following list contains some of the most common headache triggers.<sup>9</sup>

**The tabular column denotes the triggering agents for headache;**

Dietary	<ul style="list-style-type: none"> <li>• Foods or beverages containing caffeine.</li> <li>• Chocolates</li> <li>• Aged cheese</li> <li>• Alcohol</li> <li>• Hot dogs or bacon containing nitrates (a preservative), preserves meat, canned food.</li> <li>• Food containing monosodium glutamate (MSG) such as Chinese food.</li> <li>• Ice cream</li> <li>• Skipping meals</li> </ul>
Sleep	Too little or too much napping.
Hormones	Menstruation, Birth control pills
Emotional	Stress, anxiety
Drugs	Histamine, nitroglycerine, beta-blocker (propranolol)
Environmental	Bright light, weather changes, strong odours.
<b>Table 1</b>	

**AIM AND OBJECTIVE**

Aim of the study was to analyse the prevalence of headache disorders in patients reported to eye OPD and referred from various departments with complaints of headache; to evaluate the various causes of headache with special reference to ophthalmic conditions; to study various ocular manifestations in headache disorders.

**MATERIALS AND METHODS**

Our studies were based on retrospective clinical observational study. Our study was conducted in Government Vellore Medical College and Hospital, Vellore, for a period of 6 months from December 2015 to May 2016. The written consent from the patients was obtained before subjecting the patients for study.

1200 cases presenting with headache primarily reporting to ophthalmology department and referred from various other departments were subjected to detailed ophthalmological examinations like visual acuity examination by Snellen’s chart, cycloplegic refraction, slit lamp examination, intraocular pressure assessment by Goldmann Applanation tonometer, fundus examination by direct or indirect ophthalmoscope, angle of anterior chamber assessment by Goldmann three mirror gonioscopy, tear

breakup time, Schirmer’s test, convergence test, strabismus assessment by Synoptophore and other neuroimaging studies like MRI brain and CT brain, x-ray PNS, CT PNS and blood investigations like Haemoglobin %, ESR, RA factor, ANA, C-reactive proteins, VDRL, HIV 1 and 2, fasting postprandial sugar apart from blood pressure recording.

The detailed clinical examination and history elicitation included family history of headache, profession and personality of the individual, intensity and location of the headache, precipitating and relieving factors for headache, associated refractory errors, muscular imbalance, asthenopic symptoms, other symptomatology like red eye, foreign body, gritty sensation, photophobia, blurring of vision, eye tiredness, fatigue, muscle fatigue, dimness of vision, pain in and around eyes, double vision and other systemic disorders like diabetes, hypertension.<sup>10</sup>



**Fig. 1: Schirmer’s Testing for Tear Quantification**



**Fig. 2: Fundus Picture showing Papilledema**

**Inclusion Criteria**

In our study, both male and female of the age group from 10-70 years were included. Refractory error like various types of astigmatism and hypermetropic patients were included in our study. Dry eye cases with various aetiological factors were also included except HIV positive cases.

Primary, secondary and mixed headache disorder associated with ocular manifestations were included in our study.

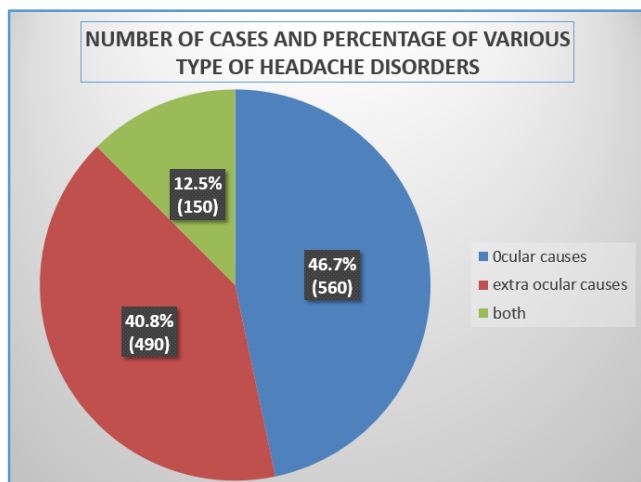
Secondary headache disorders related to neurological disorders in association with optic nerve or ocular structure involvement, for e.g., Idiopathic Intracranial Hypertension

(IIH), multiple sclerosis, giant cell arteritis, malignant hypertension with stroke and inflammatory orbital pseudotumor were also included in our study.

**Exclusion Criteria**

HIV positive individuals with dry eyes leading to headache were excluded from our studies. Children less than 10 years were not included in this study.

**RESULTS**



**Fig. 3**

In our study, 1,200 cases were who reported to eye OPD with complaints of headache during December 2015 to May 2016 were examined. Out of 1,200 cases, 560 cases were suffering from ocular manifestations from primary or secondary headache disorders. Out of the remaining 640 cases, 150 were suffering from both ocular and extraocular causes for headache. 490 cases were suffering from purely extraocular causes not involving the eyes.

Type of headache	No. of cases	Percentage
Ocular	560	46.7%
Extraocular	490	40.8%
Mixed	150	12.5%
<b>Total</b>	<b>1200</b>	

**Table 2**

**Sexual Prevalence and Percentage in Our Study:**

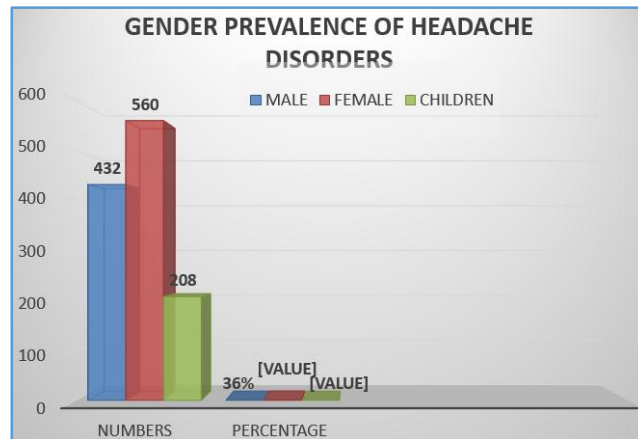
Male	Female	Children
432	560	208
36%	46.67%	17.33%

**Table 3**

In our study, prevalence of female sex was more compared to males affected by ocular causes of headache disorders. Females were more in numbers affected by migraine with or without headache.<sup>11</sup>

Analysing the age factors in relation with headache disorders, we observed an increased prevalence between 10

to 30 years of age group, among which refractive errors,<sup>12</sup> tension headache, adolescence age group migraine, anxiety and exam tension, sinusitis associated with headache were common.



**Fig. 4**

Age	No. of Cases
10-20	405
21-30	468
31-40	150
41-50	105
51-60	60
61-70	12

**Table 4**

Among the purely ocular headache disorders, prevalence was predominantly due to uncorrected refractive errors, which results in asthenopic features commonly manifested in our study with an age group of 10-30 years, school children and adolescent with the percentage of 33.92%.<sup>12</sup> Next increased prevalence was due to muscular imbalance and convergence insufficiency with or without association of refractive errors.<sup>13</sup> Total number of these cases were 95 in number (7.92%).

Refractive errors constituted 72.6% of ocular causes of headache disorders. 10% of this group had a family history of refractive error.

Refractive Errors	No. of Cases
Simple myopic astigmatism	260
Simple hypermetropic astigmatism	40
Mixed astigmatism	23
Compound (Myopic and hypermetropic) astigmatism	45
Hypermetropia	39
<b>Total</b>	<b>407</b>

**Table 5**

Refractive error cases with the prescription of spectacles relieved from headache after wearing spectacles or contact lenses. Orthoptic exercises were needed in selected cases of muscular imbalance along with spectacles. The overall percentage of refractory error cases among

1,200 screening is 33.92%. Third increased prevalence case was muscular imbalance and convergence insufficiency with or without association of refractory errors with 95 cases (7.92%). Acute congestive stage of primary angle closure glaucoma and subacute angle closure glaucoma were 3 cases each in our study.

Next to refractive errors, dry eyes causing headache were 110 cases in our study (9.17%). Postmenopausal women and old age people associated with dry eyes were 65 cases. All individuals between 55-70 were subjected to tear film breakup time and Schirmer's test.

Positive Schirmer's test and significant TBUT in dry eyes.

Schirmer's Test		TBUT <10 secs.
<10 mm	<5 mm	
96 cases	14 cases	110 cases

**Table 6**

Dry eyes cases complicating headache: Various conditions	Number of cases
1. Postmenopausal women and old age persons	65
2. Chronic meibomitis/MGD (meibomian gland dysfunction)	24
3. Drug-induced (propranolol, isotretinoin, nitroglycerine)	3
4. Post cataract and post pterygium surgery)	18
<b>Total</b>	<b>110</b>

**Table 7**

Among primary headache disorders, 30 cases of migraine with ocular symptoms were reported.



**Fig. 5: Fundus Picture showing Pseudopapilledema**

**Referred cases from other departments seen in Ophthal OPD were;**

Secondary headache disorders	Ocular manifestations	No. of Cases Reported
Meningitis with headache	Optic neuritis	3

Idiopathic intracranial hypertension	Papilledema	2
Posttraumatic headache	Ocular motility disorder, acute iritis	6
Pansinusitis with headache	Blurring of vision, optic neuritis	12
Flu-like illness with headache	Watering, photophobia	23
Cervical spondylitis with radiating pain	-	5
Myasthenia gravis with headache	Ptosis	1
Multiple sclerosis with headache	Optic neuritis	1
Toxaemia of pregnancy with hypertension	Papilledema, blurring of vision	2
Muscular imbalance with convergence insufficiency	Refractive error, headache,	95

**Table 8**

Among the mixed causes for headache, severe anaemia, uncontrolled hypertension, pansinusitis, tension headache and migraine were commonly noted in our study.

**DISCUSSION:** Extraocular cases like malignant hypertension, acute cervical spondylitis, anxiety and depressive disorders, migraine, sinusitis associated with head pain were referred to concerned departments for further evaluation and management. Headache occurs in 75% of individuals with hypertensive encephalopathy. Half to three quarter of adults aged 18 to 65 years in the world have headache in the last year and among those 30% or more have reported migraine.

Among the combined causes causing headache disorders, ocular causes resulting in headache were treated in our department and extraocular component leading to headache were referred to the corresponding departments like ENT, Medical, NeuroMedical, Neurosurgical, Psychiatry, Surgical, Orthopaedics and Trauma ward for further management. Multifactorial causes were usually present for extraocular causes for headache cases. Systemic diseases association were also present in secondary headache disorders.

Women on menopausal transition are more vulnerable to headache mainly due to hormonal fluctuation. The association of androgen (testosterone) and oestrogen receptors on the cornea and on meibomian gland has connection between tears and sex hormones. Deficiency of oestrogen, progesterone or testosterone result in dry eye.

Dry eye is a part of ageing process and tear production tends to diminish with age. The various medications side effects resulting in reduced amount of tear production as well as increased watery contents of tears in old age, which result in quick evaporation from eyes resulting in dry eye symptoms in old age.



Dry eye symptoms are prevalent in people with migraine. Correlation between dry eye and migraine is that both conditions may arise from inflammation. Chronic meibomitis/MGD (meibomian gland dysfunction) stimulates inflammation of lacrimal glands resulting in decreased tear production. Dry eye cases on longstanding leads to eye strain and subsequently tiredness, burning sensation, itching eyes, blurring of vision and headache.

Various pupillary abnormalities noted in our study were mid dilated pupil with sluggish reaction, ill sustained pupillary reaction (Marcus Gunn pupil), partial Horner's syndrome (miosis), festooned pupil, which aided us in diagnosis of various primary and secondary headache disorders like multiple sclerosis, acute congestive stage of angle closure glaucoma and iridocyclitis.

No cluster headache, hemiplegic migraine, ophthalmoplegic migraine, retinal migraine, SUNCT (Short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing) cases were reported in our study as the sample size was only 1,200 in number. If the study would have been conducted in a larger sample would have yielded many other causes. Depression anxiety factors involved in headache individuals, especially adolescent girls in school going age group in association with refractive errors were referred to psychiatrists after management of refractive errors.

The various techniques adopted for the management of headache in children and adolescent are coping pain skill, drugs (Amitriptyline and triptans) and/or behavioural management techniques, muscle relaxation technique, use of calm technique, yoga and exercises. This will reduce the intensity and frequency of headache and depressive symptoms in youth age group of 10-17 years.

## CONCLUSION

In our study, we observed among primary headache disorders migraine and tension headache were commonly present, whereas, cluster headache case was not reported. As the sample size was only 1,200 in our study, we did not come across the cluster headache case. Migraine and tension headache disorders also presented as mixed headache disorders mixed in the form of either ocular or extraocular causes of secondary headache disorders namely astigmatism, hypermetropia, dry eye, muscular imbalance and hypertension. Among the pure ocular causes for headache, the prevalence reported by us as refractive errors 407 cases, dry eyes 110 cases, acute congestive stage of primary angle closure glaucoma 3 cases and subacute angle closure glaucoma 3 cases. Extraocular causes of headache 490 cases were referred to other departments after ruling out ocular causes. Among 150 cases of systemic diseases with involvement of ocular findings as well as ocular causes resulting in headache, ocular management done and referred back to concerned speciality department for further

management. Hence, our observation in this study was that, total multidisciplinary workup by various specialities will detect extraocular causes for headache in the patients suffering from acute or chronic headache. Complete cure from headache can be given most of the time by ophthalmologist only with the help of other speciality.

Headache is the most important complaint a patient presents with at an ophthalmologist clinic next to defective vision. Though headache is multifactorial in origin, ocular causes share a major place among these. Detailed ophthalmological evaluation reveals a lot of common ocular causes, which needs a simple management avoiding anxiety among the patients. It also helps in identifying few rare ocular causes, which if neglected may end up with major morbidities like glaucoma, iritis and amblyopia.

Hence, an ophthalmologist may play a vital role in establishing the final diagnosis of headache.

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