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Original Research Paper

DRY EYE AND MIGRAINE: A CLINICAL CO-RELATION

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ABSTRACT:
BACKGROUND: Dry eye and migraine are common diseases with large societal and economic burdens in recent literature. previous studies indicates harmony in pathogenesis of dry eye and migraine. In busy ophthalmic opd underviewing increasing burden of ocular discomfort in migraine patient quick examination and diagnosis helps improving quality of life in migraine sufferers. **OBJECTIVE**: In current study we aim to study association between dry eye and migraine. DESIGN: Population Based Cross Section Study. **METHOD**: This study was conducted in department of ophthalmology. Navodaya medical hospital, Raichur from october 2020 to july 2021. In this study evaluation of association of dry eye in migraine patient was elucidated by undertaking questionaries for symptoms of dry eye and confirmation was performed by conducting schirmer's test, Tear film breakup time test and Tear meniscus test. **RESULT**: OUT OF 50 patients who underwent study .21 were male and 29 were female .severe migraine disability was reported in 68 % and mild to moderate migraine disability was seen in 32% out of which 29 % Of male migraine patients and 58 % of female migraine patients showed symptoms and confirmatory signs of dry eye. out of total study population on average 66 % had dry eye features.

Keywords: Dry eye , migraine , schirmers test ,tear meniscus.

INTRODUCTION:

Migraine is multifactorial disorder with complex neuronal and vascular mechanism that encompasses a wide clinical spectrum of symptoms including ocular manifestation.' it is disorder that presents with unilateral headache and several sensory symptoms. photophobia is one of the ophthalmic manifestation causing significant morbidity[2] . Migraine is clinically diagnosed in the setting of recurrent attacks of unilateral pulsatile or throbbing headaches that may last hours to days[3]. DE represents a spectrum of clinical manifestations including symptoms such as dryness, discomfort, and pain sensations and ocular surface disturbances due to increased tear evaporation or decreased production[3] About 25% of patients experiencing aura or sensory symptoms experienced photophobia which is one of the symptom of dry eye before or during the migraine episode[3]. Photophobia is experienced by patients with severe migraine and those with other Neuro-ophthalmic disorder. It is included as one of the major criteria for migraine m international classification of headache disorder and has been stated as "abnormal sensitivity of light, especially to eyes[4]. Migraine has held the attention and interest not only of internists and neurologists for many years. but also of ophthalmologists because of the close association of ocular signs and symptoms with this diseases Due to change in lifestyle no. of migraine cases are increasing as 1t 1s one of the cause of unbearable pain it is prudent to understand its multi systemic manifestation to improve the line of treatment .migraine roughly affects 15 % of population making itself third most world wide disease all over world 33% diagnosed with migraine suffer from ocular manifestation. Patients presenting in ophthalmology clinic usually complains of perio-orbital pain, photo phobia, dryness, discomfort .this symptoms mimics symptoms of dry eye .hence rapid ophthalmic rapid evaluation of their co relation and treatment accordingly will help in improving quality of life in migraine sufferers.

OBJECTIVE:

To study association between dry eye and migraine.

METHODOLOGY:

In total. 50 migraine sufferers underwent study from October 2021 to June 2021.The study includes 21 male and 29 female with average range of age group from 15 - 55. Patients with any kind of ocular disease including allergic eye disease, lacrimal dysfunction, a

history of ocular trauma or surgery • use of certain medications including antihistamines, decongestants, artif1c1al tear eye drops, topical agents, oral contraceptives or anti-inflammatory drugs were excluded. Patients with systemic illness like with malignancies, chronic renal, hepatic or cardiovascular disease, diabetes. thyroid disease, psychiatric illness. inflammatory or autoimmune diseases such as Sjogren's syndrome were excluded Additionally, those who were pregnant. morbidly obese. current smokers or, contact lens wear in the previous month or eye drop use within 2 hours .current consumption of alcohol were excluded as well . Patient who directly walked in to ophthalmology OPD and those referred from physician after clinical diagnosis were included in this study. Patients medical histories, physical and neurological examinations were performed by the same physicians. The migraine diagnosis was made according to the International Classification of Headache Disorders II diagnostic criteria.

Measurement of impact of migraine on life was assessed by MIDAS questionaries (past 3 month questionaries)

<u>Questionaries included</u> :

- Days of leave from work in last 3 month.
- days of reduced performance at work due to headache in last 3 months.
- failure to do household work due to head ache in last 3 month.
- days of reduced performance in household work in last 3 months.
- days where in social interaction was missed due to headache last 3 months.

MIDAS GRADE

MIDAS GRADE	DEFINITION	MIDAS SCORE
Grade 1	Little or no disability	0-5
Grade 2	Mild disability	6-10
Grade 3	Moderate disability	11-20
Grade 4	Severe	21 +

Before starting ocular examination the severity of migraine affecting the ocular aspect of life was studied individually by asking OSDI (OCULAR SURFACE DISEASE INDEX)questionnaires .That gave idea of dry eye severity and effect of vision function along with quality of life lived by migraine sufferers .The OSDI is a 12-item questionnaire to assess ocular surface symptoms. The OSDI has an overall score and three subscale scores (ocular symptoms: FIVE items; vision-related function: FIVE items; and environmental triggers: THREE items

Subscale 1(experienced any of the following):

- Eyes tat are sensitive to light ?
- Eyes that feel gritty ?
- Painful or sore eyes ?
- Blurred vision ?
- Poor vision ?

Subscale 2 (limitation in performing following task):

- Reading ?
- Driving at night ?
- Working with computer or ATM
- Watching TV

Subscale 3 : (Have eyes felt uncomfortable in any of follow places):

- Windy condition
- Places with low humidity
- Area with air conditioner?

Each OSDI item is scored on a scale ranging from 0 to 4 points, where 0 indicates ‘none of the time’ and4‘all of the time’. The OSDI overall scores range from 0 to 100. Based on their OSDI scores, participants were categorized as having normal (0–12 points), mild (13–22 points), moderate (23–32 points), or severe (33–100 points) ocular surface disease. After completing the Ocular Surface Disease Index (OSDI) questionnaire ocular examination for dry eye was conducted. Tear meniscus height, tear meniscus area were measured. tear breakup time with fluorescein stain (TBUT) and the Schirmer test without topical anesthesia were assessed. At least 10 min of break was given between the tests. Those who could not tolerate and/ or complete the performed tests were excluded from the study pool.

<u>Objective Testing</u>:

Objective tests for dry eye can be divided into tests that examine the tears and those that examine the integrity of the ocular surface. further be subdivided into tests that investigate the quantity, quality or functional properties of tears.

1. **Functional quality test:**

- The tear breakup time (TBUT) was used to examine quality of tear film.
- Fluorescein dye was smeared into the lower fornix, and the patient is first asked to blink

several times and then was asked to avoid blinking.

- A broad beam with cobalt blue filter is used to scan the tear film.
- The presence of black spots or lines indicated the appearance of dry spots in the tear film Tear film breakup time (TBUT) is the interval between the blink and the appearance of the first randomly distributed dry spot. A TBUT of less than 10 seconds is considered abnormal .[14]

2. Tear Quantity:

- Technique used to evaluate tear quantity is the Schirmer test 1, performed without anaesthesia.
- In this test, a 5×35mm strip of WHATMAN filter paper that is bent 5mm from the end was placed in the lower fornix [11] at junction of lateral one third and medial two third.
- The strip is kept in place for 5 minutes and then the length of the moistened strip is measured.
- A result yielding less than 5mm shows aqueous tear deficiency. Reading less than 10 indicates dry eye disease
- Another noninvasive method used is the tear meniscus height measurement on the lower eyelid, whereby a height lower than 0.5mm is associated with tear deficiency.

Schirmer test value less than 10 mm/5 min, TBUT shorter than 10 s, Tear meniscus <0.5 mm and OSDI value higher than 13 were considered to be abnormal participants having at least two of these three criteria were defined as having dry eye.

RESULTS:

Demographic profile:

In total, 65 patients with migraine were recruited for the study, and 50 patients(29 females and 21males) met the inclusion criteria .Median age of the included patients was 47.5years (range15–65year)

Table 1 : EPISODIC distribution.

	YES (%)	NO(%)
Male	2(28.57)	7(77.78)
Female	5(71.43)	2(22.22)
Total	7(100)	9(100)

Out of 50 patient 9 males and 7 females showed episodic pattern of migraine out of which 28.57% male and 71.43% female showed dry eye feature

Table No 2 : Chronic Distribution

	YES (%)	NO(%)
Male	5(21.74)	7(63.64)
Female	18(78.26)	4(36.36)
Total	23(100)	11(100)

Out of 50 study patients 12 male and 22 female showed chronic migraine disease pattern out of which 21.74% male and 78.26% female showed presence of dry eye.

Table No 3: MIDAS Score Distribution.

MIDAS SCORE	MALE(%)	FEMALE(%)
Grade 1	10(47.61)	6(9.52)
Grade 2	9(42.85)	19(65.51)
Grade 3	2(9.52)	3(14.28)
Grade 4	0(0)	1(3.44)
Total	21(100)	29(100)

On average 42.85 % MALE and 65.51% female showed MIDAS grade 2.

Table No 4 : OSDI Score

	AVERAGE	DRY EYE PRESENT	DRY EYE ABSENT
OSDI	**8.9**	**22.4**	**9.6**

Ocular surface disease score was found to be 8.9 as an average for all patients included in study. Ocular surface disease score for patients showing dry eye feature was 22.4 on average while those without dry eye features on examination was 9.6

OSDI SCORE	MALE	FEMALE
0-12	7(33.33)	11(37.93)
13-22	12(57.14)	11(37.93)
23-32	2(9.54)	5(17.24)
33-100	0	2(6.89)

Reduced OSDI score was seen in 64 % of study group out of which 28 % were male and 6 % were female. Mean OSDI score study group of 50 was beetween 16 – 22 indicating mild – moderate index range.

Table No 5 : TBUT distribution.

After ocular examination for dry eye it was seen that 68% of patient showed presence of dry eye due to reduced tear film breakup time out of which 38.23 % were male and 61.76 % were female

TBUT	MALE (%)	FEMALE (%)
< 10 SEC	10(76.92)	13(61.90)
< 5 SEC	3(23.08)	8(38.09)
Total	13(100)	21(100)

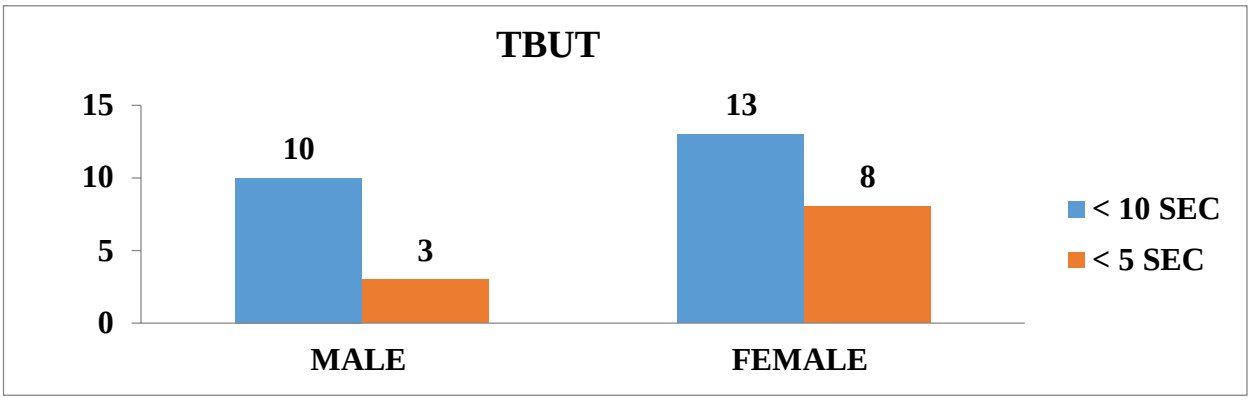


Table No 6: Schirmer's Test distribution.

Dry eye prevalence in Schirmers test showed 68 % prevalence out of which male were 47.05% and female were 52.94 %.

SCHIRMER'S TEST	MALE(%)	FEMALE(%)
15 – 10SEC	5(23.80)	11(37.93)
< 10 SEC	13(61.90)	13(44.82)
< 5 SEC	3(14.28)	5(17.24)
Total	21(100)	29(100)

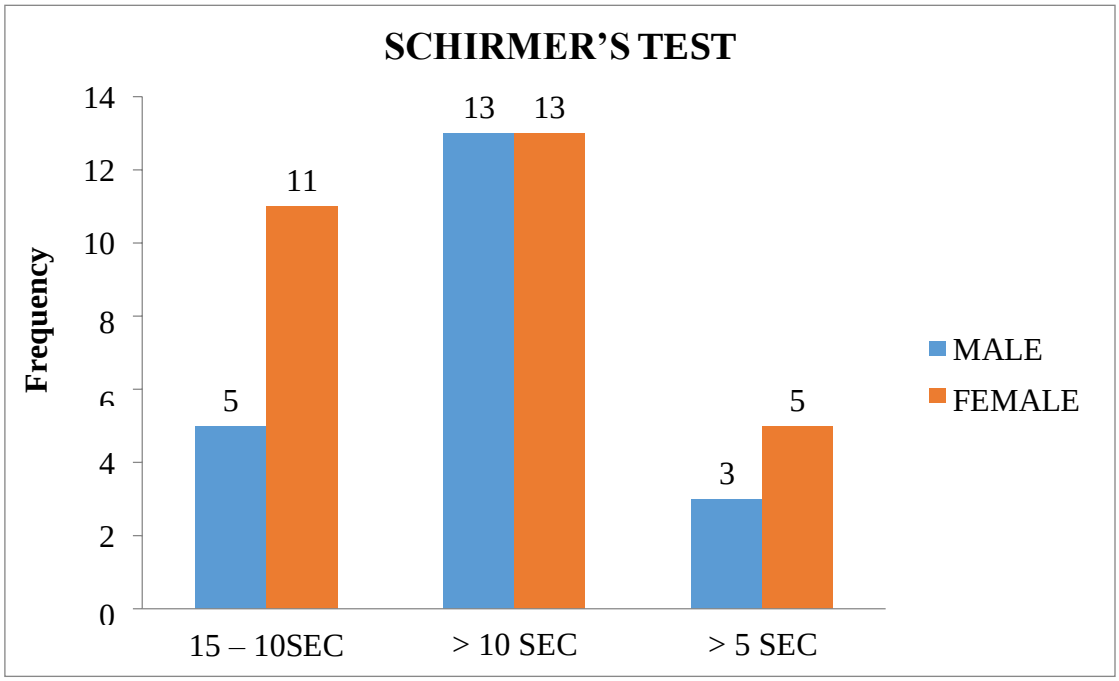


Table No 7 : Tear meniscus distribution.

Reduced tear meniscus was seen in 62 % patients out of which 29.41 % were male and 67.74% were female .

TEAR MENISCUS	MALE	FEMALE	TOTAL (Percentage)
NORMAL	11(57.89)	08(42.10)	19(100)
ABNORMAL	10(32.25)	21(67.74)	31(100)

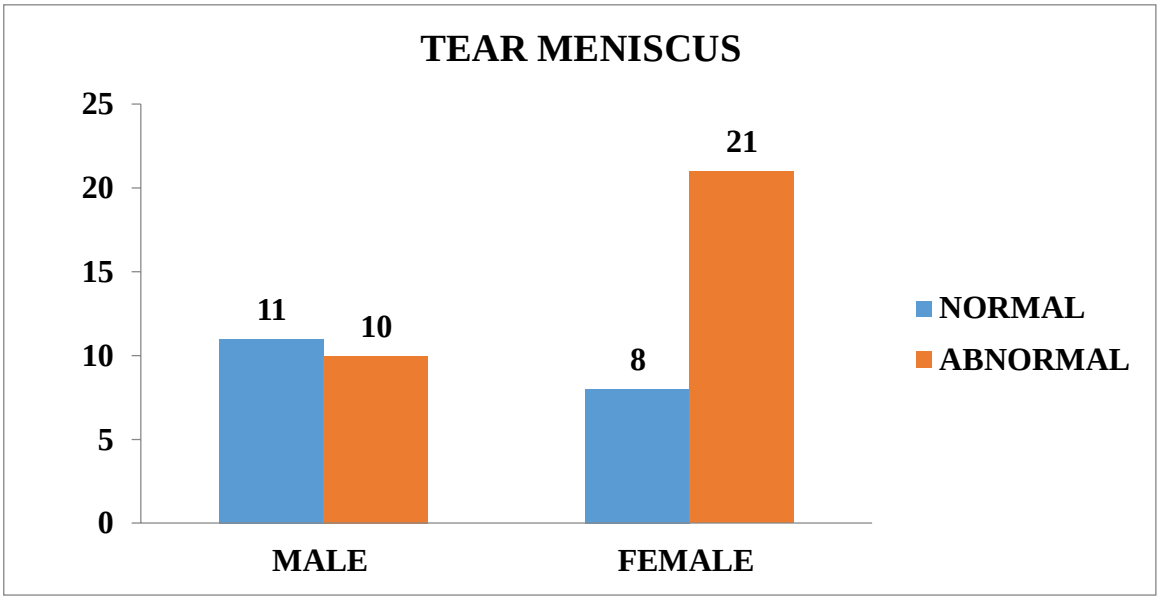
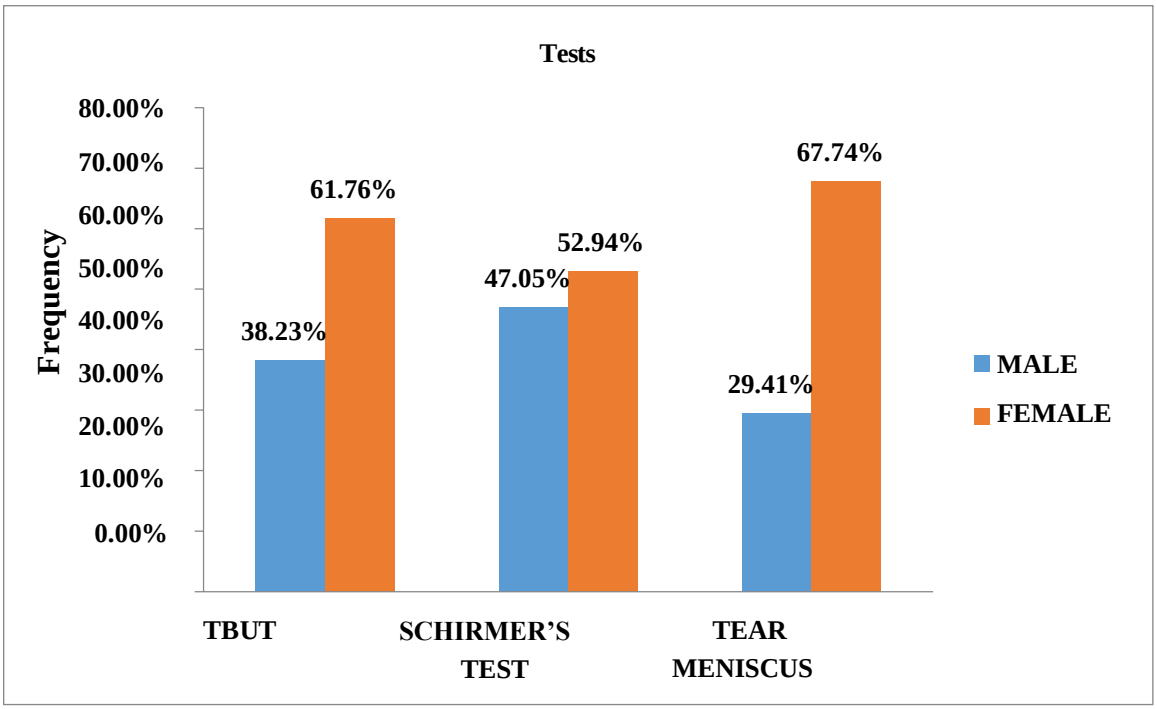


Table 8: Prevalence in all tests performed:

	MALE	FEMALE
TBUT	38.23%	61.76%
SCHIRMER,S TEST	47.05%	52.94%
TEAR MENISCUS	29.41%	67.74%



Out of all 50 patients who surpassed inclusion criteria it was seen 66 % had dry eye. It was seen that pt. with chronicity of disease showed more prevalence of dry eye than those showing episodic attacks .since the severity of disease was more chronic in female group hence the prevalence was more in females than in males

DISCUSSION:

In recent years, the pathophysiology of migraine is better understood. Both migraine and dry eye share some common pathogenesis which develops the essentiality to understand their association. The purpose of our study is to study the association of two entities as the harmony in pathogenesis of both has been depicted in the literature as below:

Hypotheis 1:

Trigemino vascular input from meningeal vessels passes through the ophthalmic branch of the trigeminal nerve. Thus trigemino-autonomic pathway may play a role in migraine.[2] To re- evaluate this hypothesis a multi-center, randomized, double blind trial demonstrate that e- TNS(TRIGEMINAL NERVE STIMULATION) is effective for acute pain relief during migraine attacks in adult subjects, providing a reduction of mean pain intensity. [18].The eye and orbit are densely innervated by autonomic effectors, most of which course along branches of the trigeminal nerve [2].On other hand The corneal blink reflex begins with unmyelinated afferents from ciliary branches of V1, which synapse in the trigeminal nucleus caudalis (TNC). The supraorbital blink reflex involves mixed afferents, which synapse in both TNC and the principal trigeminal nucleus. Blink reflex can be elicited by stimulation of trigeminal nerve - trigeminally-evoked responses .[2]To support this hypothesis recent studies have concluded that ocular surface dryness may trigger reflex tearing through the trigeminal nerve, and activation of the trigeminal nerve may trigger migraine headache and aura.[19]

Hypothesis 2:

Although both migraine and dry eye have multifactorial causes, it appears that inflammation is also the most likely common factor. Migraine is thought to develop from the release of vasoactive neuropeptides that activate an inflammatory tissue response, also known as sterile neurogenic inflammation. [6,15] CGRP, a 37-amino acid neuropeptide, is a principal sensory vasoactive neuropeptide with vasodilatory, immunomodulation, and inflammatory roles in migraine. [20] On other hand other studies followed and demonstrated the role of pro-inflammatory cytokines and matrix metalloproteinases (MMPs) in the pathogenesis of dry eye. A decrease in the biologically inactive precursor IL-1β have been found in the tear film of dry eye patients .[17]

Hypothesis 3:

Nerves that compromise the SBNP arise from nasociliary branch of ophthalmic nerve their axons synapse in the brainstem and serve nociceptive, trophic and protective function.[12] Rohit Shetty et al . conducted study that investigates changes in corneal sub basal nerve plexus in migrainers with and without photophobia .analysis of corneal SBNP features revealed decrease in corneal nerve fiber length ,total branch density, fiber area in migrainers[2]. The presence of structural changes in nociceptive corneal axons lends further support to the hypothesis that the

trigeminal system plays a critical role in the pathogenesis of migraine. Based this observations the authors propose that dry eye symptoms appeared to be extremely prevalent in this migraine patients.[12] The similar pathogenesis for both the diseases explained in these hypothesis develops the curiosity to examine their co relation and test the degree of association helped in better understanding the co relation of dry eye and migraine which can further be studied to get prompt treatment to improve the quality of life in migraine patients. Similar results were seen in a study conducted by Ozge et Al where they concluded Dry eye symptoms and findings are higher in migraine patients when compared with the healthy subjects without the presence of Sjögren syndrome[21]. Our study showed significant prevalence of dry eyes in migraine patients .similar results were seen in study conducted by Koktekir et al. who investigated the tear film functions and clinical symptoms of patients with migraine and found significantly lower tear function test results compared with normal subjects in migraine patients.[15] Our study showed significant higher prevalence of migraine in females than males similar results were elucidated in a study conducted by Omar Ismail et al. The results of this study suggest a link between migraine headaches and DED .results suggest that female sex and advanced age play an important role in determining the strength of this association.[7]

CONCLUSION :

We conclude from our study that there is association between dry eye and migraine at the same time patients with migraine showed greater prevalence of dry eye. Dry eye can be a manifestation or trigger factor of migraine hence timely detection of dry eye symptoms and early dry eye assessment is necessary to improve line of management and giving a better quality of life in migraine sufferers .The study shows higher prevalence of dry eye in females as compared to male due to greater chronicity of disease in females than males.

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