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An Observational Study to have Deeper Insights into Sleep Pattern Leading to Central Serous Chorioretinopathy among Healthy Individuals

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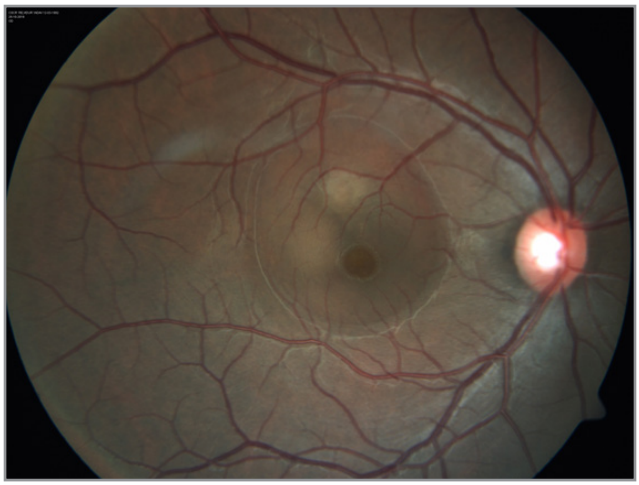
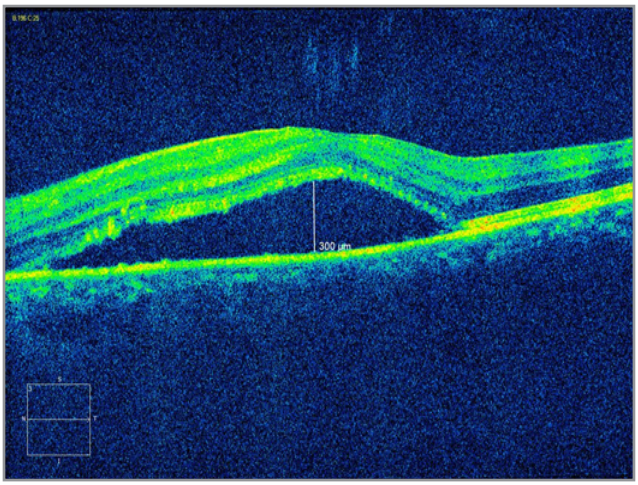
Introduction

Central Serous Chorioretinopathy (CSCR) is a serious vision threatening ocular condition, commonly seen in the young males in the reproductive age group. Type A personality increased corticosteroid levels in the blood and male gender are the few risk factors attributed to this condition [1-3]. CSCR exhibits a serous pigment epithelial detachment (PED) accompanied by neurosensory detachment, (Fig 1) making it part of the pachychoroid spectrum. Fundus presentation involves retinal pigment epithelium (RPE) mottling, reduced fundus tessellation, and the absence of drusens. OCT supports this, indicating a shallow neurosensory detachment in chronic cases, contrasting with acute cases where large NSD with serous PED (Fig 2) and occasional subretinal fibrin may be present. Enhanced depth imaging (EDI) OCT reveals choroidal thickening, pachyvessels, (Fig 3) and focal RPE changes. Fundus fluorescein angiography (FFA) in acute cases shows a smokestack pattern (Fig 4) and ink blot types of leaks, while chronic cases display staining due to window defects. Indocyanine green angiography (ICG) reveals choroidal hyperpermeability (Fig 5) with pachyvessels. Autofluorescence demonstrates mixed granular patterns and gravitational tracks (Fig 6), suggesting chronicity [4].



Fundus Photo

Figure 1: Fundus photo of right eye depicting 4 DD large NSD (neurosensory detatchment) over the macula with 1/2 DD PED over fovea



Oct Findings

Figure 2: OCT image showing distorted foveal contour with sub retinal fluid of 300 microns seen.

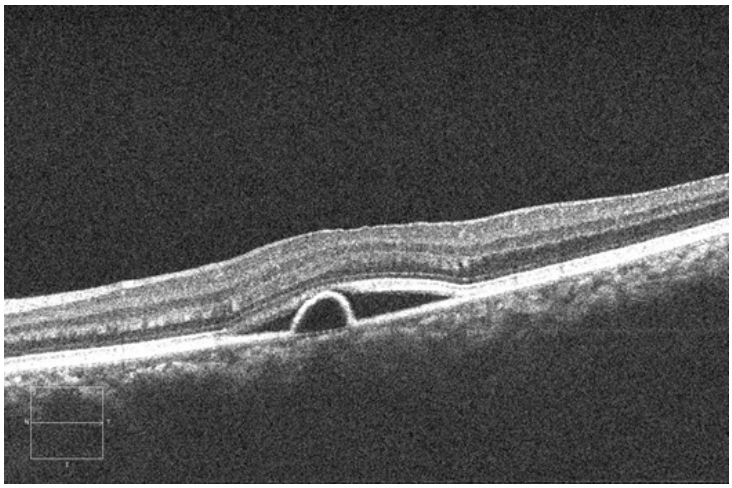


Figure 3: EDI (Enhanced Dept Imaging) Oct Showing Thickened Choroid as CSCR is Part of Pachychoroid Spectrum

FFA Features
A) Smokestack Leak

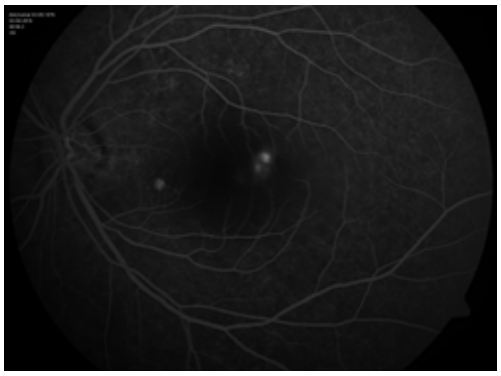


Figure 4a: 0.56s

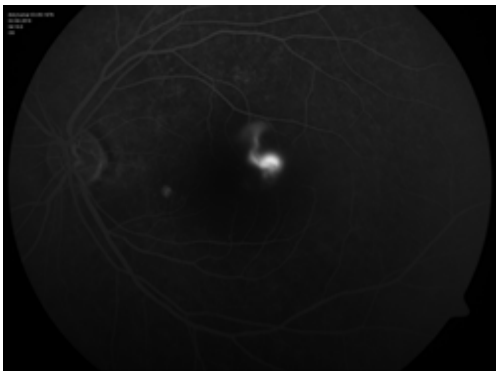


Figure 4b: 4.18min

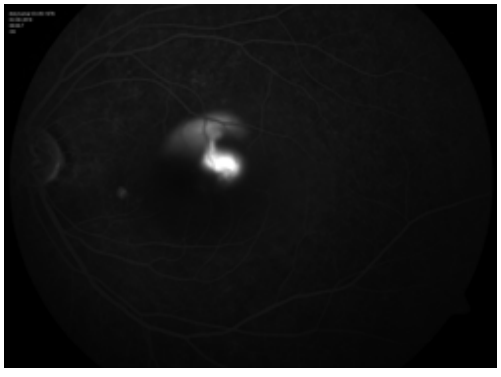


Figure 4c: 9 min

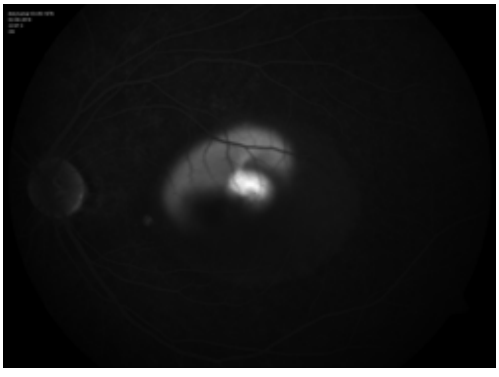


Figure 4d: 22 min

Figure 4: Fluoroscein angiography of patient taken at successive time frame depicting hyper- flouroscence which is increasing in size and taking shape of umbrella or mushroom is suggestive of smoke stack appearance in the patient of CSCR.

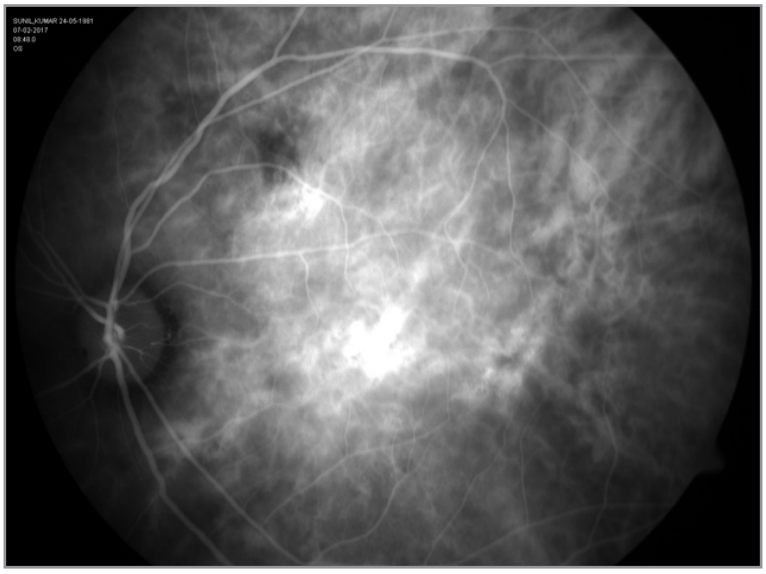


Figure 5: ICG of left eye suggestive of hypercyanescence over fovea and superonasal to macula during mid phase suggestive of choroidal hyper permeability at multiple points.

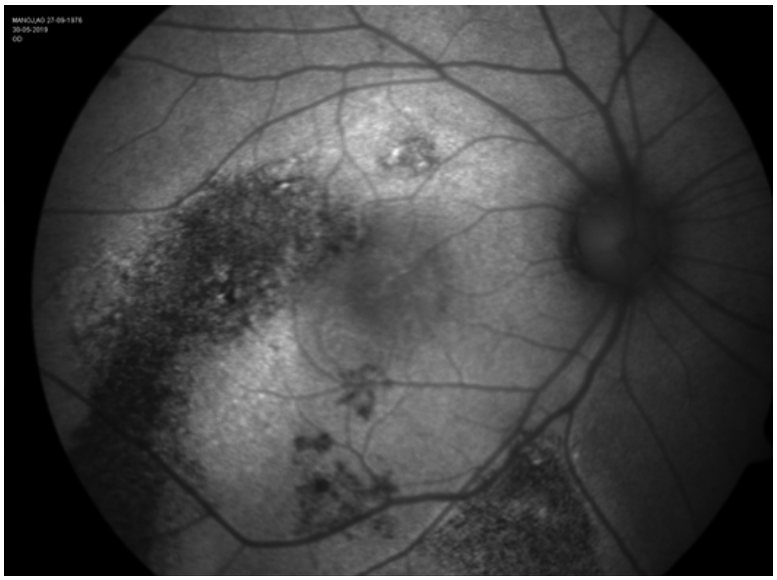


Figure 6: FAF image of right eye suggestive of hyperfluoroscence with RPE atrophy (type 3) or gravitational tracks

Materials and Methods

To have deeper insight into the clinical pattern and profile of patients with CSCR, an observational study was carried out at our center. The duration of the study was for 01 year. The study was performed with informed patient consent, and conducted under a protocol approved by the local ethics committee and in accordance with the ethical standards stated in the 1964 Declaration of Helsinki. 41 patients, aged between 20-50 years who were found to have CSCR were included in this study. After taking a thorough history, comprehensive ophthalmology examination was done in all the patients. Fundus fluorescein angiography (FFA), Fundus autofluorescence (FAF), Indocyanine angiography (ICGA) and Optical coherence Tomography (OCT) was done in all the patients Individuals on systemic corticosteroid therapy, recent history of surgery and pregnancy were excluded from the study.

Results

Statistical Analysis

SPSS (Statistical Package for Social Sciences) version 20. [IBM SPASS statistics (IBM corp. Armonk, NY, USA released 2011)] was used to perform the statistical analysis

- Data was entered in the excel spread sheet.
- Descriptive statistics of the explanatory and outcome variables were calculated by mean, standard deviation, media for quantitative variables, frequency and proportions for qualitative variables.

Table 1: In 41 cases, unilateral eye involvement was seen in 28 (68.29%) while bilateral involvement was seen in 13 (31.7%) cases.

Table 1: Distribution of the Subjects Based on Eye Involved

Eye involved	Frequency	(Percent)
Bilateral	13	(31.7)
Unilateral	28	(68.29)
Total	41	(100.0)

Graph 1: Distribution of the Subjects Based on Eye Involved

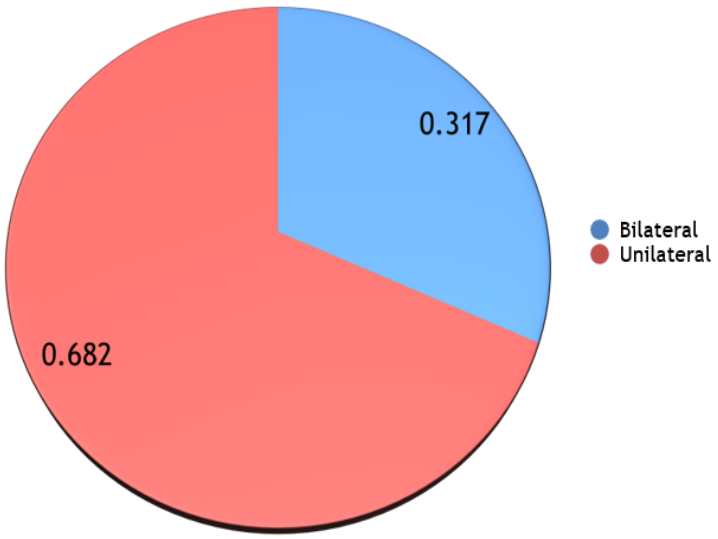


Table 2: Among 41 CSCR patient, 24 (58.5%) had acute event of < 3 months duration and 17(41.4%) were chronic cases with one patient having onset since 2012 with multiple episodes thereafter.3 patients had more than 4 recurrences in between.

Table 2: Distribution of the Subjects Based on Chronicity

Eye involved	Frequency	(Percent)
Acute	24	(58.5)
Chronic	17	(41.4)
Total	41	(100.0)

Graph 2: Distribution of the Subjects Based on Chronicity

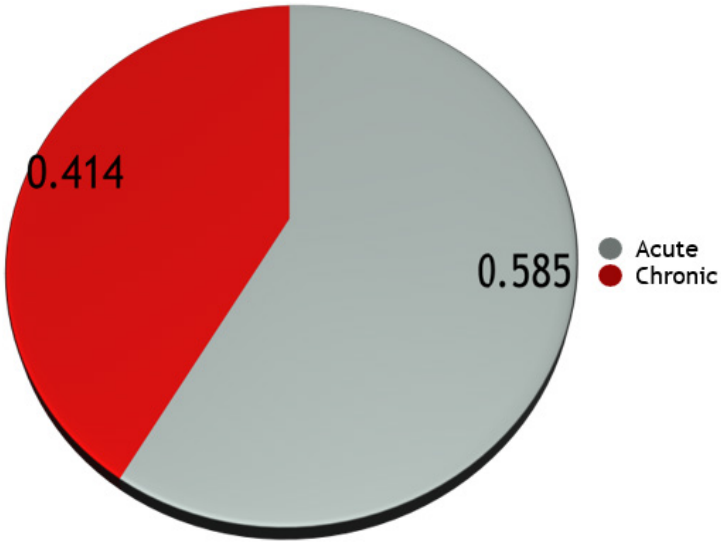


Table 3: The visual acuity by Snellen chart in CSCR patients was 6/9 or better in majority 16(39.0%) in both bilateral and unilateral cases. Amongst unilateral cases maximum cases had vision <6/9 with worse visual acuity <6/60 in 2 (4.8%) cases. Amongst bilateral cases maximum 5(12.1%) had <6/60 vision Majority of our patients never complained of diminution of vision with 6/6 vision recorded in 16 eyes out of 82 eyes.

Table 3: Distribution of the Subjects Based BCVA

	Unilateral cases		Bilateral cases		
Worst vision	**Frequency (Percent)**		**Frequency (Percent)**		**Total**
<6/9	12.	(29.26)	4	(9.7)	16(39.0)
6/12 - 6/24	9	(21.9)	3	(7.3)	12(29.26)
6/24 - 6/60	5	(12.1)	1	(2.43)	6(14.6)
>6/60	2	(4.8)	5	(12.1)	7(17.0)
Total	28	(68.29)	13	(31.7)	41(100.0)

Graph 3:

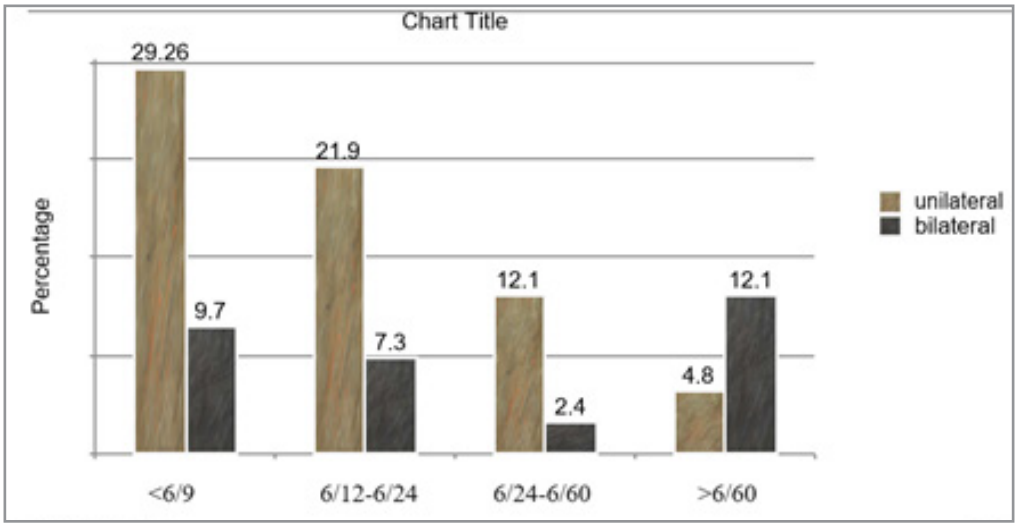


Table 4: On clinical evaluation during indirect ophthalmoscopy followed by 90D examination, out of 82 eyes examined neurosensory detachment over macula was seen in 12eyes (14.6%), pigment epithelium detachment in 15 eyes (18.2%) with maximum 29 (35.3%) had only old pigmentary changes. 16 eyes (7.61%) were found to have sub retinal precipitates with 9 eyes (17.39%) were normal if contralateral eye had the pathology.

Table 4: Distribution of the Subjects Based on Ophthalmoscopic Findings in Retina (Both Eyes)

Retina findings	Number of eyes involved (Percent)
NSD	12 (14.6)
PED	15 (18.2)
Pigmentary changes	29 (35.3)
Sub retinal precipitates	16 (19.5)
Gravitational track	1 (1.02)
No ophthalmoscopic finding	9 (17.39%)

Graph 4: Distribution of the Subjects Based on Retina (Both Eyes)

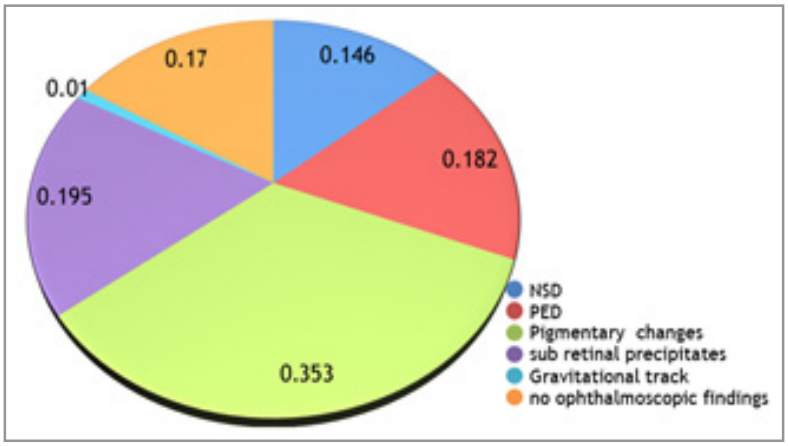


Table 5: On further investigation, in FFA out of 82 eyes typical smoke stack leak was seen in 9, ink blot was seen in 10, with 18 eyes showing focal leaks and 23 eyes showing window defects or staining in late phase of the angiogram.

Table 5: Distribution of the Subjects Based on Type of Leak on Fluoroan Giography.

Type of leak	Frequency
Smoke stack	9
Ink blot	10
Focal leaks	19
Gravitational tracks	1
Staining /Window defect	23
Normal angiography	20
Total	82

Graph 5: Distribution of the Subjects Based on Type of Leak

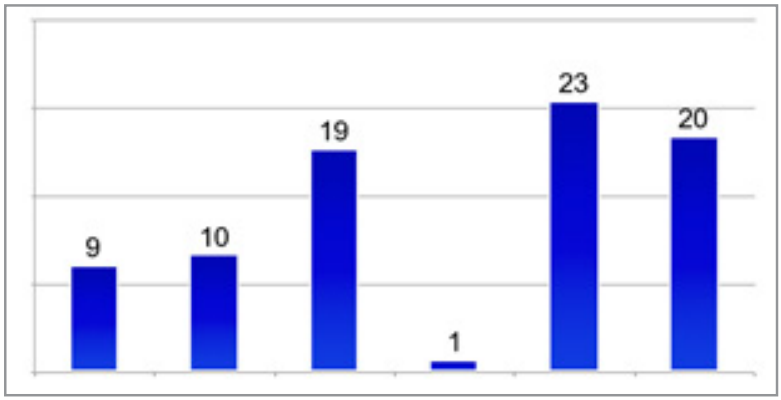


Table 6: On fundus autofluorescence out of 41 cases, maximum cases who had first episode showed reduced autofluorescence whereas patients who had autofluorescence with atrophy also known as gravitational tracks, (typical of chronic CSCR) were 4 in number, with one patient having symmetrical bilateral gravitational tracks in both eyes (who was managed with oral tab Eplenerone)

Table 6: Distribution of the Subjects Based on Fundus Autofluoroscence Finding (Gravitational Tracks)

Type	FAF Findings	No of patients
1a	Reduced autofluoroscence	9
1b	Diffuse hyperautofluoroscence	2
2a	Granular hyperAF	6
2b	Granular hypoAF	1
2c	Mixed AF	8
3	Autofluoroscence associated with atrophy	4

Graph 6:

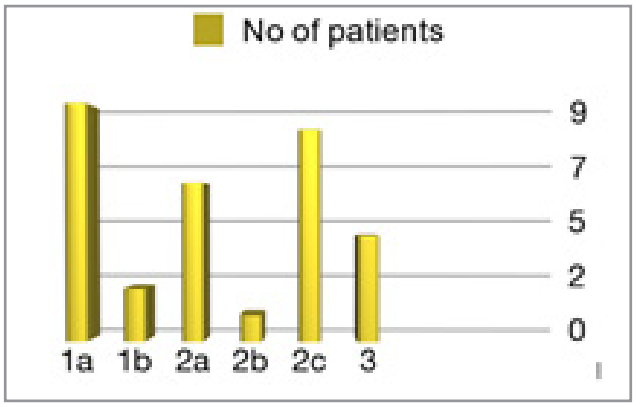


Table 7: When history was being taken out of 41 cases of CSCR, 6 (14.6%) gave history of stress or some anxiety in life with one patient suffering from bereavement of his son who died few months back from the first onset of symptoms

Table 7: Distribution of the Subjects Based on Stress or Anxiety

Stress or anxiety	Frequency	Percent
NO HISTORY	37	(90.2)
POSITIVE HISTORY	4	(9.7)
Total	41	(100.0)

Graph 7: Distribution of the Subjects Based on Stress or Anxiety

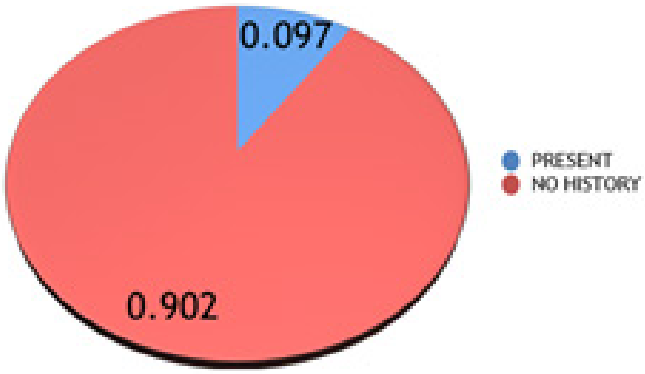


Table 8: 41 patients of our study,40 were males and on interrogating 6 (14.6%) gave history of night shift duties in which sleep cycle was affected or there was lack of proper circadian rhythm being followed.

Table 8: Distribution of the Subjects Based on Night Shift Duties

Night shift duties	Frequency	Percent
NO	23	(56.1)
YES	18	(43.9)
Total	41	(100.0)

Graph 8: Distribution of the Subjects Based on Night Shift Duties

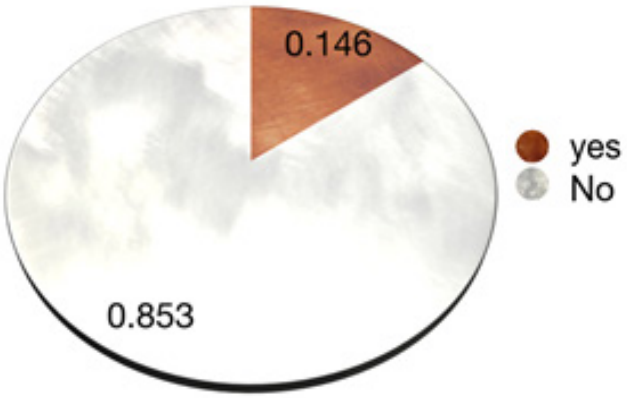
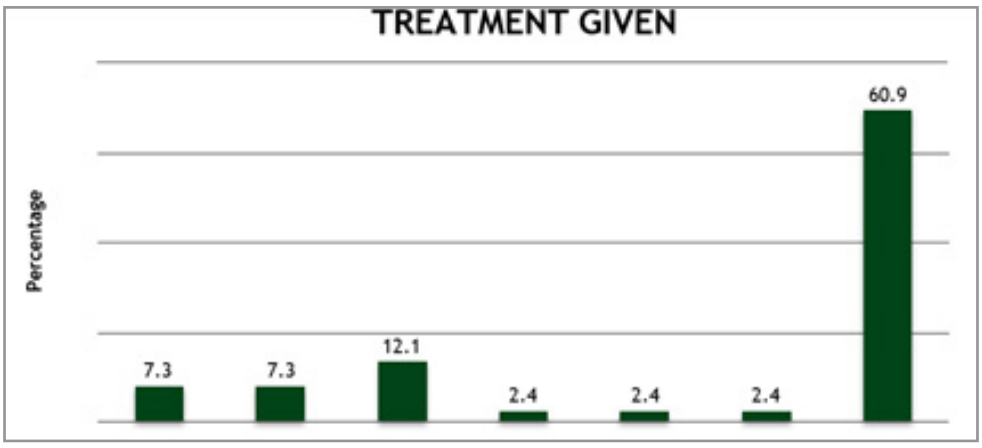


Table 9: As a part of treatment, majority CSCR patients 27(65.8%) was not offered any treatment and had spontaneous resolution over due course of time. 3(7.3%) received Anti VEGF in form of Inj Avastin in due course of treatment over the years. Laser was done either in form of focal Laser in 3(7.3%) cases or Micro pulse in 5(12.1%) cases. PDT alone was done in 1 case and 1 case received both micro pulse and PDT treatment. 1 patient was prescribed E/D Nepafenac only.

Table 9: Distribution of the Subjects Based on Treatment Given

Treatment given	Frequency	(Percent)
Anit VEGF	3	(7.3)
Focal laser	3	(7.3)
Micropulse laser	5	(12.1)
Micropulse laser and PDT	1	(2.4)
Nepafenac	1	(2.4)
PDT	1	(2.4)
Spontaneous resolution	27	(65.8)
Total	41	(100.0)

Graph 9: Distribution of the Subjects Based on Treatment Given



Discussion

The etiology and pathogenesis of Central Serous Chorioretinopathy (CSCR) continues to baffle ophthalmologists. Multiple factors play role in triggering CSCR, particularly in individuals under constant stress due to tight deadlines, demanding environments and disturbed sleep patterns.

In our observational study, we conducted thorough examinations including history, clinical assessments, and laboratory investigations. None of the subjects exhibited existing systemic illnesses. Five subjects, identified with exogenous steroid intake, post-renal transplant, post-traumatic conditions, optic granuloma, or strabismus, were excluded based on our study's criteria.

Notably, 68.2% of patients experienced unilateral eye involvement. Among the 41 cases, 24 were acute, and all three cases with abnormal values were acute as well, suggesting a potential link between deranged testosterone levels and acute CSCR. Examining 82 eyes, we found that 39% had 6/6 vision but presented with symptoms such as micropsia, metamorphopsia, scotoma, or decreased contrast sensitivity.

Exploring additional risk factors, only 9.7% had a history of stress or anxiety, with one patient developing CSCR shortly after the death of their son [2].

In the pursuit of identifying disturbed sleep patterns as potential risk factors, we discovered that 18(44%) of cases reported a history of deranged circadian rhythm, including a sailor in the navy who experienced a second episode of CSCR during extended sea voyages [5]. Considering the proposed role of melatonin [4] in CSCR treatment, our study contributes valuable insights into this complex condition.

Conclusion

Central Serous Chorioretinopathy (CSCR) is getting prevalent among healthy individual with no known comorbidities, attributed to factors outlined earlier. Early diagnosis and addressing modifiable risk factors, such as sleep deprivation and altered circadian rhythms can not only prevent ocular morbidity but also alleviate declining work performance and can contribute to better ergonomics.

Financial Interest

Nil

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