Influence of Professional Status and Psychological State in Development of Central Serous Chorioretinopathy, and it's Response to Treatment Outcome

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ABSTRACT

Purpose: To study the influence of the professional and current psychological state in developing Central serous chorioretinopathy (CSCR) and its correlation with outcome.

Methods: A prospective non-randomized case-control study on 49 patients with various CSCRs underwent Spectral-Domain Optical Coherence Tomography (SD-OCT) at baseline and six months and Fundus fluorescein angiography (FFA) to all non-resolving recurrent cases. Profession profile was assessed by categorized into blue-collar, white-collar jobholders, self-employed, and others. The patient's current psychological state was assessed by a general health questionnaire (GHQ12). Two sets of similar questionnaires were given to cases, and controls (age/gender-matched with problems other than CSCR) and non-professionals were given a single questionnaire to assess their psychological state in two different environments.

Results: High prevalence of CSCR was observed in blue collars (63%) followed by white-collar (14%) jobholders, self-employed (4%), and others (19%). Recent psychological stress scores were significantly higher in cases compared to controls ($t=5.147$, $p<0.001$). Dependency of type of presentation on the recent psychological state was not significant ($p= 0.25$). Dependency of central foveal thickness (CFT) and visual acuity (VA) on the psychological state is statistically significant ($p<0.01$).

Conclusions: This study was the first study to evaluate the professional status and psychological stress of CSCR patients in the Indian population. Higher psychological stress scores observed in CSCR, especially blue-collar jobholders. These higher psychological stress score patients showed more CFT and worse VA at baseline. The structural and functional outcomes of all CSCR were similar at 6 months follow-up.

Keywords: Central Serous Chorioretinopathy, Optical Coherence Tomography, General Health Questionnaire, Central Foveal Thickness, Visual Acuity.

INTRODUCTION

Central serous chorioretinopathy (CSC) is a chorioretinal disease characterized by a serious detachment of the macula's neurosensory retina. This disease affects young males aged between 20 and 50 years.[1] Risk factors include stress, type A personality, exogenous steroids, acid-peptic disease, high heart rate, and hypertension.[2] Acute CSCR recedes spontaneously within 1-3 months without any significant visual impairment. [3] Conversely, the chronic type (chronic CSCR) lasts longer, even for a few years.[4] The sequelae of unnoticed extramacular episodes in affected or fellow eyes appear as hyperfluorescent because of increased transmission through localized RPE atrophy.[5-7] One of the advances in treating CSCR is subthreshold micropulse laser therapy (SMPLT). Diode micropulse laser, anti-VEGF (like intravitreal bevacizumab and ranibizumab injections), and corticosteroid antagonists are also in use for treating CSCR.[8]

To date, laser photocoagulation remains an option in acute CSCR patients with SRD persisting for more than four months and a clear leak on FA, located more than 500 mm away from the fovea. A subthreshold diode micropulse laser (810 nm) was proposed for the treatment of CSCR. Photodynamic therapy (PDT) with verteporfin has been

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employed to treat chronic and acute CSCR and reduce recurrences. No literature guidance was available regarding the association of job profile and CSCR. Moreover, findings of the psychological status of CSCR patients still need replication. Hence the current study aimed to determine the psychological status of CSCR patients using GHQ 12 and compared them with those of healthy controls. The study aims to identify the influence of professional profile and psychological state in the development of CSCR.

Subjects and Methods:

This prospective non-randomized case-control study conducted at a tertiary care Eye Institute on patients diagnosed with central serous chorioretinopathy from July 2015 to June 2016 and followed upto1 year. The study protocol was approved by the Institutional ethical committee. Informed consent was obtained from each participant.

Inclusion criteria were clinically diagnosed cases of central serous chorioretinopathy (new and recurrent), and cases followed up for six months. Exclusion criteria include patients with retinal problems other than CSCR, Patients with age above 50 years, Patients using steroid medication, Follow up of <6 months, and non-consenting patients. For Controls, inclusion criteria include age and gender-matched controls and patients who attended the OPD with problems other than CSCR.

In this study, the patient profession differentiated into white-collar and blue-collar jobs. A "white-collar worker" is a salaried professional, referring to general office worker and management. A “blue-collar worker” is a working-class member who performs manual work and either earns an hourly wage is paid a piece rate for work done.[9] The 12-Item General Health Questionnaire (GHQ-12) includes 12 questions to assess the severity of current psychological state over the past few weeks using a 4-point Likert scale (from 0 - 3). The score was used to generate the total score from 0 to 36. The higher scores indicate worse health. In working professionals, we assessed the patient’s personal and professional lives separately through two questionnaires to assess their mental status concerning different environments. The scores were totalled in each one, and the higher score was taken for the purpose of analysis.

Clinical examination includes visual acuity, anterior segment evaluation, Intraocular pressure (IOP) was measured by tonometer and gonioscopy was performed as part of routine check-up, and posterior segment evaluation was done by slit-lamp bio-microscopy using 90D lens and indirect ophthalmoscopy. The visual acuity recorded was converted into the logarithm of the maximal angle of resolution in minutes of arc (log MAR) in order to provide a common linear scale allowing easy analysis of the data. OCT was performed as a baseline investigation and on final follow-up. Central sub foveal macular thickness (Central foveal thickness- CFT) was done by Cirrus HD spectral-domain Optical coherence tomography system (Carl Zeiss Meditech, Inc, Cirrus HD-OCT 4000, Soft version 6.0) with a macular cube and 5-line raster after full dilatation of the pupils.

Recovery of visual acuity typically occurs within 1-4 months, coinciding with the neurosensory retina reattachment, so Observation is the standard initial management in most cases of acute CSCR. All the patients were managed conservatively. In non-resolving or persistent CSCR cases, argon laser photocoagulation was performed after 3-4 months from onset of presentation, and in case of recurrence, it was performed 1-2 months from onset. After confirmation of the site and pattern of leakage on FFA Green (514 nm) argon laser photocoagulation was attempted to “seal” the RPE leakage points by giving two or three low to moderate intensity burns to the leakage site (200 µm, 0.2sec), which produce mild greying of RPE. In cases where the leakage is near or within the foveal avascular zone, laser photocoagulation is contraindicated, photodynamic therapy (PDT) is the standard treatment modality in such cases. Due to its high cost, given intravitreal ANTI VEGF (Bevacizumab (Avastin) at a dose of 1.25mg/0.05ml) injections in such cases. All the patients were followed every month for six months, and OCT assessed the outcome at their baseline and final follow-up. Their CFT values were compared and evaluated functionally by recording unaided visual acuity at presentation compared to the final VA.

Statistics analysis: Statistics done using SPSS (version 22, SPSS Inc, Chicago, IL). Descriptive statistics were calculated for all parameters recorded in the study. Quantitative variables like age, central foveal thickness, psychological scores, and visual acuity have been described in the form of mean and standard deviation. Formulated hypotheses tested for significance using paired t-test, unpaired t-test, and chi-square test. A p-value <0.05 has been considered statistically significant.

RESULTS

In our study of 49 patients with CSCR, the age of the patients ranged from 20 - 50 years with a mean age of 36.18 ± 7.59 years. 13 (26%) patients were aged between 20-30 years, 20 (41%) were aged 31- to 40 years, and 16 (33%) were aged between 41-50 years. 11 (22%) were female patients, and 38 (78%) were male patients. CSCR was present in the right eye in 18 patients (37%), with the

rest of the patients being affected in the left eye (63%).

Patients with blue-collared jobs are 31 (63%) these are the member of the working class who performs manual work and either earns an hourly wage or is paid piece rate for work done like drivers (4), farmers (5), waiters (3), Private job holders (9), Carpenter (2), Tailor (1), Government job holders (4), daily labours, etc. Patients with white collared jobs are 7 (14.2%) – [doctors -2, pharma company managers – 2, scientist -1, police -1, schoolteacher -1]. 2 (4%) patients were self-employed, and 9 (19%) patients were non-professionals like housewives (5), students (3) and unemployed (1). In this study, blue-collar job holders were commonly affected, followed by white-collar jobholders and others. (Table 1). Out of 38 males, 15 (40%) patients having mild stress (score 0-3), 20 (52%) patients were with moderate stress (scores 4-8), and 03 (08%) patients with severe stress (9-14). Out of 11 females, 2 (18%) patients having mild stress, 5 (46%) patients were with moderate stress and 4 (36%) patients with severe stress. It is confirmed that females were having severe psychological stress compared to males.

The CFT measured in 49 patients ranged from 207- 1050 µm with a mean of 430.80 µm (SD-146.16). CFT in 3 categories assesses the severity based on the results: < 300 µm, 300 – 600 µm, and > 600 µm. It was observed that OCT - the macular thickness (CFT) is higher at their presentation, which got resolved to their normal range in most of the cases at their final follow-up visit showing statistically significant (Table 2).

FFA was done to 28 patients, of which 21 (75%) patients have persistent or non-resolving CSCR, and 07 (25%) patients had recurrent episodes. FFA showed inkblot leak in 20 (71.42%) patients (at foveal avascular zone (FAZ)-5, supertemporal quadrant -9, inferotemporal quadrant – 6). Smokestack sign in 3 (10.71%) patients, non-specific signs like stippled fluorescence and window defects in 3 (10.71%) patients, and there is no leak in 2 (7.14%) patients.

Out of 49 patients, 25 (51%) patients resolved with counselling and Observation. The remaining 24 patients under-went procedures included focal laser and intravitreal bevacizumab (Avastin) 1.25mg /0.05ml. Finally, 22 (45%) patients had VA of 6/12 or better (log MAR ≤0.3) at 6months follow-up, and two patients had VA between log MAR 0.3 -1. These two patients had residual fluid at the end of our study period.

The outcome of CSCR patients is assessed functionally by visual acuity. VA measured during presentation in 49 patients ranged from 0 (6/6) to 2 (CF) with a mean of log MAR VA 0.572 (SD 0.465). Patients with VA ≤ 0.3 (6/12 or better) is 23 (47%), between 0.3 - 1 were 16 (33%) and with VA ≥1 (6/60 or worse) was 10 (20%). VA measured during final follow-up ranged from 0 (6/6) to 0.6 (6/24) with mean log MAR VA 0.102 (SD 0.144). Patients with VA ≤ 0.3 were 48 (96%) and between 0.3 - 1 were 2 (04%). It is observed that 26 (53%) patients were having a VA of 6/12 or worse (log MAR ≥ 0.3) at presentation compared to 2 (4%) patients at their final follow-up. 47 (96%) patients got resolved with a VA of 6/12 or better (≤ 0.3). A strong positive correlation of VA improvement was observed between initial and final follow up which was found to be statistically significant (P < 0.001) (Table 3).

Among 49 CSCR cases, 21 (43%) patients were with acute presentation resolved with Observation in 3 – 4 months. 20 (41%) patients were with persistent or non –resolving CSCR, among which four patients presented late, 3months

Table 1: *Range of GHQ 12 scoring system.*

Score	Cases N (%) mean ± SD		Control N (%) mean ± SD		T value	P value
0-3: mild	17 (35%)	4.78 ± 2.781	37 (76%)	2.39 ±1.288	5.147	< 0.01*
4-8: moderate	25 (51%)		12 (24%)			
9-14: severe	7 (14%)		0 (0%)			

* Independent samples't' test.

Table 2: *Results of OCT macular thickness (CFT).*

OCT	CFT			CFT Range: (µm)	Mean ± SD	't' value	p value
	< 300µ (%)	300 – 600µ (%)	>600µ (%)				
Baseline n (%)	8 (16)	37 (76)	4 (8)	207-1050	430.80±146.161	9.831	< 0.001
Final n (%)-6 months	44 (88)	6 (12)	0	172-347	239.96±49.463		

*Paired sample'T' test.

Table 3: *Statistical analysis table of VA (log MAR).*				
VA (Log MAR)	Base line	FINAL	t value	P Value
≤ 0.3	23 (47)	47 (96)	8.290	<0.001
0.3 - 1	16 (33)	02 (4)		
≥ 1	10 (20)	0		
Mean ± SD	0.5727 ± 0.465	0.1029 ± 0.14440		
*Paired sample'T' test.				

after the start of symptoms. 08 (16%) patients presented to us who gave previous episodes of CSCR (recurrence).

Relation between current psychological state and type of presentation was assessed. In our study, out of 21 patients with acute presentation, 10 (48%) patients having mild stress (scores 0-3), 10 (47%) patients were with moderate stress (scores 4 – 8), and 01 (5%) patient with severe stress (with score 9-14). Out of 20 patients with non-resolving CSCR, 04 (20%) patients having mild stress, 11 (55%) with moderate stress, and 05 (25%) patients with severe stress. Out of 08 patients with recurrent CSCR 03 (37) patients were with mild stress, 04 (50%) patients with moderate stress, and 1(13%) patient with severe stress.

It is considered that patients with the acute presentation had mild-moderate stress, non-resolving cases were with moderate-severe stress scores, and that of chronic recurrent cases were having mild-moderate stress scores (P = 0.25).

In our study, out of 8 patients with CFT < 300µm, 05 (62%) patients having mild stress (scores 0-3), 03 (38%) patients were with moderate stress (scores 4 - 8). Out of 37 patients with CFT 300 - 600µm, 11 (30%) patients having mild stress, 20 (54%) were with moderate stress, and 06 (16%) patients with severe stress (scores 9-14). Out of 04 patients with CFT > 600µm, 01 (25%) patients having mild stress, 02 (50%) patients were with moderate stress, and 01 (25%) patients with severe stress.

Comparison between psychological state and final CFT were analysed. Out of 43 patients with CFT < 300µm 16 (37%) patients having mild stress (scores 0-3), 22 (51%) patients were with moderate stress (scores 4 – 8) and 5(12%) patients with severe stress (score 9-14). Out of 6 patients with CFT 300 - 600µm, 1(17%) patient having mild stress, 03 (50%) were with moderate stress, and 2 (33%) patients with severe stress. No patient is having CFT of > 600µm on the final visit.

It is observed that at their initial presentation, moderate and severe psychological stress scores were found to be more in patients having CFT 300-600µm. But 43 (88%) cases got resolved to the normal range of OCT with CFT <300µm irrespective of their psychological status at their final follow-up visit, which was proven to be significant (P <0.001) (Table 4).

At baseline, out of 22 patients with baseline log MAR visual acuity ≤ 0.3 (6/12 or better), 8 (36%) patients having mild stress (scores 0-3), 13 (59%) patients were with moderate stress (scores 4 – 8) and 1(5%) patient with severe stress (scores 9-14). Out of 17 patients with baseline log MAR visual acuity between 0. 3 – 1 (6/12 - 6/60), 8(47%) patients having mild stress, 7 (41%) patients were with moderate stress, and 2 (12%) patients with severe stress. Out of 10 patients with baseline log MAR visual acuity, ≥1 (6/60 or worse) 1(10%) patient having mild stress, 5 (50%) patients were with moderate stress, and 4 (40%) patients with severe stress.

At final stage, out of 47 patients with final log MAR visual acuity ≤ 0.3 (6/12 or better), 16 (34%) patients having mild stress (scores 0-3), 24 (51%) patients were with moderate stress (scores 4 - 8) and 07 (15%) patients with severe stress (with score 9-14). Out of 02 patients with final log MAR visual acuity between 0.3-1 (6/12 - 6/60), 01 (50%) patient having mild stress, 01 (50%) patient with moderate stress.

Hence, at baseline, the psychological stress scores were comparable with baseline VA. Patients with VA≤0.3 and

Table 4: *Statistical analysis between psychological state and CFT.*				
		Mean	Std. Deviation	P Value
Group 1	GHQ 12	4.78	2.981	<0.001
	Base line CFT	430.80	146.161	
Group 2	GHQ 12	4.78	2.981	<0.001
	Final CFT	239.96	49.463	
T statistic 20.551; 32.827 (Independent sample test)				

between 0.3-1 showed mild to moderate stress scores. Patients with worse VA of ≥1 showed moderate to severe stress scores, but 47 (96%) cases got resolved to VA of ≤ 0.3 (6/12 or better) on final follow up irrespective of their psychological status, which found to be statistically significant with (P <0.001) (Table 5).

DISCUSSION

In this study, 78% were males and 22%were females with a mean age of 36.18 ± 7.59 years. The incidence was highest in the 31 - 40-year age group, followed by the 41 -50 year age group. Females were most affected in a slightly younger age group (20- 30 years) than males (31-50 years). Nooshin Bazzazi *et al*., who assessed anxiety scores using the Hamilton anxiety rating scale in 30 CSCR patients, found no difference in anxiety scores among males and females.[10]

In our study, a high prevalence (63%) of cases of blue-collared job, followed by white-collared job holders (14%), self-employed (4%), and non-professionals like housewives, students, and unemployed (19%). A study by Claudia Spahn *et al.* on psychosomatic aspects in patients of CSCR found that out of 24 patients, white-collar professionals 12 (50%), blue collars 4 (17%), Self-employed 6 (25%), and Others 2 (8%).[11] Hence, our study is the first Indian study to evaluate the relation between professional profile and CSCR.

Our study shows the psychological stress was higher in cases than controls (t=5.147, p<0.001). In the SCL 90-R, 37% of patients showed elevated psychic stress. The patients showed heightened emotional instability, insecurity, flexibility, and spontaneity in the Sixteen Personality Factor Questionnaire. Siguan and Aguilar found that patients with CSCR were more likely to display tendencies to schizophrenia (84%), hysteria (83%), depression (75%), psychopathic deviance (67%), and hypochondriasis (58%) than the control.[12]

In our study, cases with acute presentation had mild to moderate stress scores, non-resolving CSCR cases were more associated with moderate to severe stress scores,

Annexure. The 12-item General Health Questionnaire (GHQ 12)

1. Been able to concentrate on what you're doing?
   0. Better than usual 1. Same as usual
   2. Less than usual 3. Much less than usual
2. Lost much sleep over worry?
   3. Much more than usual 2. Rather more than usual
   1. No more than usual 0. Not at all
3. Felt you were playing a useful part in things?
   0. Better than usual 1. Same as usual
   2. Less than usual 3. Much less than usual
4. Felt capable of making decisions about things?
   0. Better than usual 1. Same as usual
   2. Less than usual 3.Much less than usual
5. Felt constantly under strain?
   3. Much more than usual 2. Rather more than usual
   1. No more than usual 0. Not at all
6. Felt you couldn't overcome your difficulties?
   3. Much more than usual 2. Rather more than usual
   1. No more than usual 0. Not at all
7. Been able to enjoy your normal day -to- day activities?
   0. Better than usual 1. Same as usual
   2. Less than usual 3. Much less than usual
8. Been able to face up to your problems?
   0. Better than usual 1. Same as usual
   2. Less than usual 3. Much less than usual
9. Been feeling unhappy and depressed?
   3. Much more than usual 2. Rather more than usual
   1. No more than usual 0. Not at all
10. Been losing confidence in yourself?
    3. Much more than usual 2. Rather more than usual
    1. No more than usual 0. Not at all
11. Been thinking of yourself as a worthless person?
    3. Much more than usual 2. Rather more than usual
    1. No more than usual 0. Not at all
12. Been feeling reasonably happy, all things considered?
    0. Better than usual 1. Same as usual
    2. Less than usual 3. Much less than usual

Table 5: *Statistical analysis table between psychological state and VA.*

		Mean	Std. Deviation	P Value
Group 1	GHQ 12	4.78	2.981	<0.001
	Presenting VA	0.5727	0.46561	
Group 2	GHQ 12	4.78	2.981	<0.001
	Final VA	0.1029	0.14440	
T statistic is 10.546, 11.125 (Independent sample t test)				

and recurrent cases had mild to moderate stress scores that were not statistically significant (p= 0.25). The recurrent CSCR cases were associated with mild to moderate stress, which is not in accordance with the Nooshin Bazzazi *et al.* study on the effect of anxiety scores on idiopathic CSCR shows that anxiety was significantly higher in both first-time and second time CSCR patients. This variation in our study may be due to the fact that the psychological state of the past is not included.

At baseline, patients with baseline CFT of <300µm showed milder stress scores, and that of patients with CFT of 300-600µm and >600µm were having moderate and severe stress scores was found to be significant (t=20.551; P<0.001). 88 %(n=44) cases got resolved to the normal OCT range with CFT <300µm irrespective of their psychological state at their final 6months follow-up period, which was proven to be statistically significant (t=32.827, P<0.001). No literature guidance was available regarding the association of CFT on the psychological state to compare with our study.

At baseline, patients with VA ≤0.3 and between 0.3 -1 showed mild to moderate stress scores, and patients with a worse VA of ≥1 showed moderate to severe stress scores, which was significant (t=10.546, p <0.001). In 96% (n=47) of cases, VA improved to log MAR ≤ 0.3 (6/12 or better) after six months follow up irrespective of their psychological status, which was proven to be significant (t=11.125, P <0.001). FFA was done for all chronic, persistent, and recurrent cases (n=28). Among them, 71% of cases had an inkblot pattern, and 11% of cases had smock stack pattern of leakage. This is similar to Jamil *et al.* and Khalil *et al.'s* studies.[13,14]

In this study, 51% of patients (n=25) were managed through counselling and Observation. The remaining 24 patients received treatments that included a focused laser and 1.25mg/0.05ml intravitreal Bevacizumab (Avastin) injection. Finally, at 6 months follow-up, 45% (n=22) of patients had VA of 6/12 or greater (log MAR≤0.3), and two patients had VA between log MAR 0.3 and 1.0. These two patients had residual fluid at the end of our study period.

Two factors were used to evaluate the outcome in our study. The first is anatomically determined by SD-OCT-central foveal thickness, and the second is functionally determined by measuring the VA. On OCT, acute CSCR appears as an elevation of the full-thickness neurosensory retina from the highly reflective RPE-choriocapillaris complex separated by an optically empty zone with/without RPE detachments and significantly increased choroidal thickness in patients.[15,16] In our study, the mean CFT measurement in the affected eye at baseline was 430.80 µm (SD 146.16 µm) and at 6month follow up was 239.96 µm (SD 49.46 µm), showing statistical significance (t=9.831, p<0.001). Kim *et al.* found that CFT at baseline was 528.8 µm and at final follow up was 233.9 µm (p<0.001).[16]

Visual prognosis in acute CSCR is usually favourable, with complete recovery in most cases after the first episode. During the acute stage of CSCR, the refractive state will be towards the hypermetropic side. With hyperopic correction patients, visual acuity improves to normal range. Once the acute phase resolves, the refractive state comes back to the original refractive state. Hence in our study, we have considered the patients were presenting visual acuity (unaided vision). In our study, the mean log MAR VA was 0.57, and the final mean log MAR VA was 0.10 (p <0.01) with a positive correlation of VA improvement between initial and final vision. These results were similar to Islam QU *et al*. study, which showed the baseline mean log MAR BCVA of 0.47 and the final mean log MAR BCVA of 0.18 (p<0.01).[17] Wong et al. found acute CSCR resolved spontaneously/following treatment had a good long-term prognosis for visual functions.[17]

CONCLUSION

Females were having severe psychological stress compared to males. OCT - the macular thickness (CFT) is higher at baseline, which was resolved to normal in most cases at the final follow-up visit. Higher psychological stress scores observed in CSCR with blue-collar professionals. Even though the higher psychological stress score patients showed more CFT and worse visual acuity at presentation, the final structural and functional outcome of all types of CSCR was similar at 6 months follow up.

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