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Personality Traits, Psychological Stress, and Anatomical Biomarkers in Central Serous Chorioretinopathy: A Multimodal Case–Control Study

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Abstract

Background: To investigate the anatomical and psychological characteristics of Central Serous Chorioretinopathy (CSCR) using a multimodal approach combining spectral-domain optical coherence tomography (OCT) and psychometric profiling. The study aims to explore potential correlations between personality traits and disease features to inform future risk stratification and management.

Methods: A case–control observational study involving 44 participants (22 patients with CSCR and 22 age- and sex-matched healthy controls). Participants underwent high-resolution OCT to assess choroidal thickness, subretinal fluid, and photoreceptor integrity. Psychological profiles were evaluated using the Personality Inventory for DSM-5–Brief Form (PID-5-BF) and the Temperament Evaluation of Memphis, Pisa, Paris, and San Diego–Brief (TEMPS-A-brief). Data were statistically analyzed using Python 3.11, with significance set at $p < 0.05$.

Results: CSCR was more prevalent in males (male:female ratio of 10:1), with a mean age of 50.6 years. OCT revealed increased choroidal thickness, photoreceptor disruption, and subretinal fluid in affected individuals. A positive correlation was found between age and choroidal thickness ($\rho = 0.41$; $p < 0.05$). No significant association was found with corticosteroid use. Although group comparisons in psychological traits were not statistically significant, a trend toward elevated negative affectivity was observed in the CSCR group.

Conclusions: CSCR appears to result from a multifactorial interaction between anatomical and psychological components. While no definitive psychological markers were identified, elevated negative affectivity may serve as a vulnerability trait in susceptible individuals. Further longitudinal and larger-scale studies are necessary to validate these findings and investigate the utility of psychological screening in CSCR care.

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1. Introduction

Central Serous Chorioretinopathy (CSCR) is a chorioretinal disorder characterized by serous detachment of the neurosensory retina, primarily affecting the macula. Although many cases resolve spontaneously, chronic or recurrent forms may lead to significant visual impairment, reduced contrast sensitivity, and metamorphopsia (Berger et al., 2021; Daruich et al., 2015; Fung et al., 2023; Kanda et al., 2022; Koizumi et al., 2024; Lotery, 2022; Zarnegar et al., 2023; Zigiotti et al., 2012). The condition predominantly affects males between the ages of 30 and 55 and is commonly associated with increased choroidal thickness, hyperpermeability of the choroidal vessels, and dysfunction of the retinal pigment epithelium (RPE; Bousquet et al., 2022; Brown et al., 2023; Sahoo et al., 2024; Tillmann et al., 2024; Yoneyama et al., 2022). Risk factors include corticosteroid use, systemic hypertension, obstructive sleep apnea, and psychological stress (Kang et al., 2022; Mathews et al., 2023; Sesar et al., 2021, 2023; Spaide et al., 2022).

Emerging literature has emphasized the role of psychological factors—particularly chronic stress and personality traits—in the pathogenesis of CSCR (Dudani et al., 2024; Mansour et al., 2017; Mathews et al., 2023; Mukherji et al., 2024; Sesar et al., 2021; Sharma et al., 2022). Dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis, elevated endogenous cortisol levels, and increased sympathetic activity have all been implicated in the pathophysiological cascade leading to CSCR (Cacha et al., 2019; Lang et al., 2016; Reeves et al., 2016; Stokes, 2019; Tolin et al., 2021).

Furthermore, relevant contributions have attempted to quality psychological vulnerability in the field of CSCR. According to results, the role of anxiety and depression (Bazzazi et al., 2015; Brar & Brar, 2024; Jain et al., 2022; Parshoeva et al., 2024), stress-related maladjustment (Dybała et al., 2023; Gemenetzi et al., 2010; Liew et al., 2013; Liu et al., 2016; Scarinci et al., 2019) and personality features (Çam et al., 2024; Conrad et al., 2014; Genovese et al., 2021; Lahousen et al., 2016; Mylona et al., 2022; Piskunowicz et al., 2014; Sesar et al., 2021) play a consistent role.

However, to the best of our knowledge, results have been inconsistent, with some studies showing a correlation between stress-prone personality types and CSCR, while others have found no significant differences. Further studies are necessary in order to understand the gap between positive and negative results.

1.1. Study hypotheses

This study integrates high-resolution OCT imaging with validated psychological assessments to explore the interplay between ocular anatomical changes and personality traits in CSCR. Our aim is to contribute to a more comprehensive understanding of this disease and identify possible clinical markers that can guide individualized care.

Based on the state of the art, we hypothesize:

Hp1: Presence of subretinal fluid in CSCR cases.

Hp2: No significant differences in choroidal measurements between patients with and without prior corticosteroid use.

Hp3: Significant correlations between sociodemographic, ophthalmologic and psychological variables.

Hp4: Significant differences between CSCR patients and controls across personality domains.

2. Materials and Methods

2.1 Study Design and Participants

This case–control study was conducted at the Ophthalmology Clinic and Psychiatry Unit of Policlinico "G. Martino", University of Messina, Messina, Italy. Twenty-two patients consecutively recruited and diagnosed with CSCR were compared with 22 age and sex matched healthy controls. Inclusion criteria for the CSCR group were subjects aged ≥18 years old, suffering from CSCR diagnosed by an expert ophthalmologist. Exclusion criteria were abuse of alcohol or substances use, known psychiatric diagnoses requiring medication and neurocognitive diagnosis affecting assessment validity, any other retinal pathology, or systemic diseases that could affect the retina. Comorbidity affecting results' interpretation were collected. Written informed consent was signed by all participants accepting to be included in the samples. The research was conducted in accordance with the principles of the Declaration of Helsinki and its later amendments. Psychological data was collected by an expert psychiatrist in a confidential and quiet setting performing a diagnostic interview and administrating valid measures. Both instruments were self-administered and scored by trained personnel blind to the participants' group allocation and OCT results. Demographic data, medical and ophthalmic history, and information regarding corticosteroid usage were collected. The study was approved by the Ethical Committee of the University Hospital "G. Martino" of Messina, Messina, Italy.

2.2 Psychological Assessment

All psychological features were assessed and collected using valuable instruments validated in Italian language. Two standardized psychometric instruments were used in order to assess personality features.

2.2.1 PID-5-BF

The Personality Inventory for DSM-5 – Brief Form is a brief psychometric instrument composed by 25 items evaluating maladaptive personality traits according to a 4-point Likert scale in line with the DSM-5 Section III. Items measurement ranks from 0 (not at all true) to 3 (very true) and refers to the following domains. Negative affectivity, such as lability, anxiety and distress. Detachment, meant as social withdrawal and anhedonia. Antagonisms, as manipulation, deceitfulness and grandiosity. Disinhibition, such as impulsivity and irresponsibility. Psychoticism, as in the case of odd beliefs and unusual experiences. The PID-5-BF showed reliability and validity in a high number of countries and contexts (e.g., Anderson et al., 2018; Bach et al., 2016; Combaluzier et al., 2016; Fossati et al., 2017; Hyatt et al., 2021). Its Italian clinical use (Fossati et al., 2017) highlighted Cronbach's alphas respectively ranging from .59 for detachment to .77 for psychoticism and .83 for the total score. Temporal stability was testified by good *r* values ranging from .78 (Negative Affectivity) to .97 (Detachment).

2.2.2 TEMPS-A-brief

The Temperament Evaluation of Memphis, Pisa, Paris and San Diego-autoquestionnaire version (TEMPS-A; Akiskal et al., 2005) is a brief psychometric tool composed by 39 items based on a 4-point Likert scale measuring temperament through 5 factors. The affective temperaments are Depressive, Cyclothymic, Hyperthymic, Irritable and Anxious. According to the original version, the Cronbach's alpha coefficients were 0.91 (cyclothymic), 0.81 (depressive), 0.77 (irritable), 0.76 (hyperthymic), and 0.67 (anxious) for all the subscales. The Italian validation by Preti and colleagues (2010) demonstrated validity and reliability.

2.3 Ocular Imaging

Spectral-domain OCT (Heidelberg Spectralis) was performed in all subjects. Parameters evaluated included:

- Subfoveal choroidal thickness (SCT)
- Presence of subretinal fluid (SRF)
- Pigment epithelium detachment (PED)
- Photoreceptor layer integrity

2.4 Statistical Analysis

Data were analyzed using Python version 3.11. Descriptive statistics were reported as mean ± standard deviation. After assessing the normal distribution of the study variables, Pearson's correlation coefficient was used for continuous variables, and Spearman's rank correlation was

applied to ordinal variables. The T-Student's test was used to assess significant differences among the selected groups. The significance level was set at $p < 0.05$.

3. Results

3.1 Demographic and Clinical Data

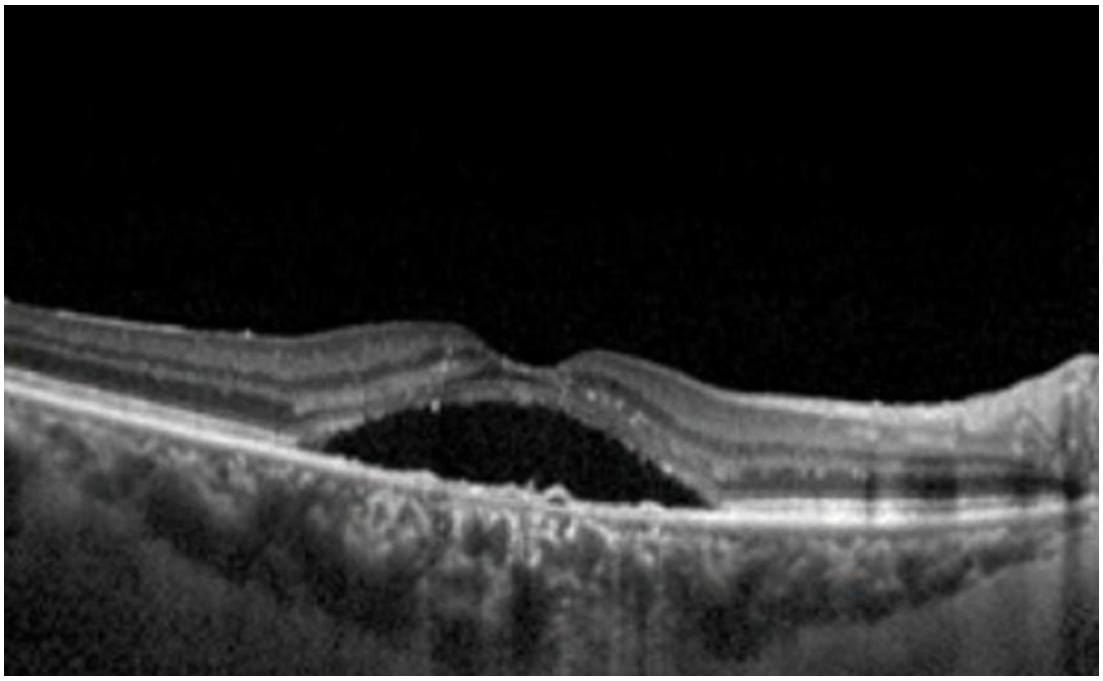
The mean age of participants in the CSCR group was 50.55 ± 7.4 years, compared to 50.32 ± 6.9 years in controls. The male-to-female ratio in the CSCR group was 10:1. Corticosteroid use was reported in 27% of CSCR cases, though this variable showed no significant correlation with choroidal thickness.

3.2 OCT Findings

OCT analysis confirmed the presence of subretinal fluid in all CSCR cases (Figure 1). Mean subfoveal choroidal thickness was 431 ± 35 μm. Photoreceptor layer disruption and PED were noted in 82% of cases. Choroidal thickness was positively correlated with age ($\varrho = 0.41$, $p < 0.05$). No significant differences in choroidal measurements were observed between patients with and without prior corticosteroid use.

Figure 1

Macular optical coherence tomography (OCT) scan acquired with Heidelberg Spectralis in a patient with Central Serous Chorioretinopathy (CSCR)



The scan reveals a serous detachment of the neurosensory retina at the foveal center, accompanied by subretinal fluid accumulation and a dome-shaped contour, which are hallmark features of the active stage of the disease.

3.3 Psychological Assessment Results

Mean scores on PID-5-BF domains were higher in CSCR patients compared to controls across all five domains. However, these differences did not reach statistical significance. The most notable trend was observed in negative affectivity, where CSCR patients had a mean score of 1.75 compared to 1.60 in controls ($p = 0.12$).

TEMPS-A-brief assessments revealed slightly elevated cyclothymic and anxious temperament scores in the CSCR group, but again, these differences were not statistically significant.

3.4 Correlations

A non-significant positive correlation was observed between negative affectivity scores and choroidal thickness ($\varrho = 0.29$, $p = 0.08$). Similar non-significant trends were noted for cyclothymic temperament and subretinal fluid volume. No significant associations were found between corticosteroid use and any psychological variable.

4. Discussion

This study confirms the anatomical hallmarks of CSCR—namely, increased choroidal thickness, subretinal fluid accumulation, and RPE disruption—while also exploring a potential psychogenic contribution through validated personality assessments. Considering the high emerging value related to interdisciplinary contributions, assessing the psychological impact of personality and related facets on CSCR represents novelty and a valuable contribution to the state of the art. According to recent contributions, less attention is paid to psychological features influencing chronic diseases course (Agorastos & Chrousos, 2022; Akyirem et al., 2022; Castelnuovo et al., 2015; Conversano, 2019; De Ridder et al., 2008; Di Giuseppe & Conversano, 2022; Jiakponna et al., 2024).

Although personality traits did not differ significantly between groups, the observed trend toward elevated negative affectivity in CSCR patients suggests a possible psychological vulnerability factor. This aligns with prior literature proposing that stress-reactive personalities may contribute to disease onset through physiological mechanisms such as HPA axis dysregulation and sympathetic overactivity (Ceruso et al., 2020; Lei et al., 2025; Nunez et al., 2025).

In particular, considering the field of interest CSCR patients demonstrated sensitivity to cortisol and related phenomena (Liang et al., 2018; Scarinci et al., 2019, 2022; van Haalen et al., 2020). For instance, the relationship between CSCR, choroidal thickness and serum hormone levels represents and important link to be studied in depth according to Çiloğlu and colleagues (2018). However, the role of corticosteroids in CSCR remains complex. While commonly implicated in

disease onset, our study found no association between steroid use and increased choroidal thickness, echoing findings from previous studies that challenge this presumed causality.

The modest correlations between psychological scores and anatomical severity support the hypothesis that psychological traits may act as disease modulators rather than direct causative factors. It is plausible that individuals with higher negative affectivity are more susceptible to environmental or physiological stressors that precipitate or worsen CSCR. However, the value of negative results remains fundamental as supported by classical and recent contributions (Bespalov et al., 2019; Smart, 1964; Weintraub, 2016).

Beyond the advantages that emerge, this study presents some limitations. The case-control design portraying the current status of patients does not comply with the need for further analyses of longitudinal nature. In fact, the current study design limits causal inference and results generalization. Thus, despite clear data emerged, following these associations through longitudinal designs would be fundamental. Moreover, the low number of involved subjects, even if compliant with recent epidemiological data, represents a limit. Larger samples and control groups would allow different analysis considering the predictive role of variables. On the basis of the emerged evidence, further contributions should study in depth these associations in order to provide novel insights through a variety of research design.

5. Conclusions

This multimodal study highlights the complexity of CSCR pathogenesis, reaffirming anatomical features while suggesting a potential role for personality traits, particularly negative affectivity, as modifiers of disease expression. Although psychological findings did not reach statistical significance, the observed trends merit further investigation. Incorporating psychological screening into ophthalmologic practice may help identify patients at greater risk for recurrence or poor visual outcomes. Future research should employ larger cohorts, longitudinal designs, and incorporate physiological stress biomarkers (e.g., salivary cortisol, HRV) to explore the mechanistic pathways linking emotional vulnerability and choroidal dysfunction.

Ethical approval

The study was approved by the Ethics Committee of the University of Messina, Italy.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

Data are available upon reasonable request from the corresponding author.

Conflict of interest statement

The authors declare no conflict of interest.

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Author Contributions

L.D.L. and M.M. designed the study; G.P. and G.G. collected and analyzed psychological data; M.M.C. performed ophthalmological data collection; F.M. and P.A. contributed to data analysis and manuscript revision; A.M. supervised the research and approved the final version.

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