Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1912
Original Article

Association between obsessive-compulsive disorder severity, recurrent infections, and inflammatory markers in adults: A cross-sectional study.

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Abstract

Background
Recent research suggests that obsessive-compulsive disorder (OCD) may be associated with recurrent infections and increased immune system activation. This study aims to investigate the relationship between OCD severity and the frequency of recurrent infections, along with biochemical markers of inflammation.

Methods
A cross-sectional observational study was conducted with 100 OCD patients, divided into two groups: those with recurrent infections and those without. Clinical data, microbiological samples, and biochemical markers (e.g., CRP, IL-6, cortisol) were collected and analyzed using statistical methods, including t-tests and correlation analyses.

Results
OCD patients with recurrent infections exhibited higher Y-BOCS scores (23.1 ± 4.5) compared to those without infections (20.1 ± 4.4), suggesting greater symptom severity. Staphylococcus aureus (40%), Escherichia coli (26.7%), and Streptococcus pyogenes (20%) were the most frequently isolated pathogens. Notably, patients with Streptococcus pyogenes and Staphylococcus aureus infections had higher Y-BOCS scores (28.5 ± 5.1 and 27.8 ± 4.3, respectively). Elevated IL-6 levels were significantly correlated with both OCD severity and infection frequency ($\beta = 0.325$, $p = 0.009$).

Conclusion
There is a significant association between OCD severity and recurrent infections, with inflammatory markers such as IL-6 playing a potential mediating role. These findings highlight the need for integrated psychiatric and infection control strategies in the management of OCD.

Recommendation
It is recommended that routine screening for infections and inflammatory markers be incorporated into the clinical assessment of OCD patients to improve treatment outcomes.

Keywords: *Obsessive-compulsive disorder, Recurrent infections, Yale-Brown Obsessive-Compulsive Scale (Y-BOCS), Interleukin-6 (IL-6), Inflammatory markers, Microbiological analysis*
Submitted: *2025-04-12* ***Accepted:*** *2025-06-07* ***Published:*** *2025-06-30*

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Introduction

Obsessive-Compulsive Disorder (OCD) is a chronic psychiatric illness marked by intrusive, distressing thoughts (obsessions) and repetitive, ritualistic behaviours (compulsions), such as excessive handwashing or cleaning. These behaviours are not only psychologically disturbing but also have physiological consequences.

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Repetitive cleaning practices can disrupt the skin's natural microbiome and damage epithelial barriers, predisposing individuals to recurrent infections [1]. Moreover, chronic engagement in compulsive rituals contributes to sustained psychological stress, which may lead to dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis and immune system, altering levels of biochemical markers like cortisol, C-reactive protein (CRP), and interleukin-6 (IL-6) [2]. Despite these plausible links, the relationship between OCD symptom severity, infection frequency, and associated biochemical stress markers remains insufficiently quantified.

OCD affects approximately 0.5% to 2% of the global population, with a typical onset in early adulthood, and is ranked among the top ten disabling mental health disorders worldwide [3]. In addition to psychological and behavioural components, emerging research suggests a biological basis for OCD, including dysregulation of monoamine neurotransmitters—such as serotonin and norepinephrine [4]—and genetic predisposition, with heritability estimates ranging from 45%–65% in childhood-onset cases and 27%–47% in adult-onset cases [5,6]. First-degree relatives of individuals with OCD show a fourfold increased risk of developing the disorder compared to the general population [7]. Immunological contributions have also been noted, particularly in paediatric populations where Group A beta-haemolytic streptococcal (GABHS) infections may trigger obsessive-compulsive symptoms via molecular mimicry involving basal ganglia proteins [8,9]. While pediatric populations with PANDAS have been well-studied, similar immunological links in adult OCD remain underexplored. Additionally, the chronic psychological stress associated with OCD could influence immune function, potentially altering inflammatory markers and the body's response to infections [10]. Recent studies have suggested that increased inflammatory markers, such as CRP and IL-6, might correlate with the severity of OCD symptoms, though the nature of this relationship remains poorly understood [11-13]. This highlights the need for comprehensive research exploring how the psychological and physiological aspects of OCD interact, particularly regarding immune responses and infection susceptibility.

Given this context, the current study aims to bridge the gap between behavioural, immunological, and biochemical aspects of OCD. The primary objective is to assess the association between OCD symptom severity and the frequency of recurrent infections. The secondary objectives include (i) evaluating changes in biochemical stress markers—specifically cortisol, CRP, and IL-6—in OCD patients with and without recurrent infections, and (ii) identifying common microbial pathogens involved in these infections. By examining these variables together, the study seeks to provide a multidimensional perspective on how obsessive-compulsive behaviours may influence systemic health.

Methods

Study design

This study was a cross-sectional observational investigation conducted to examine the association between obsessive-compulsive disorder (OCD) severity, recurrent infections, and inflammatory markers.

Study setting

The study was carried out at Dharanidhar Medical College and Hospital, Keonjhar, Odisha, India. The research was conducted over one year, from January 2023 to December 2023, through collaboration between the Departments of Psychiatry, Microbiology, and Biochemistry.

Participants

Participants were adults aged 18 to 50 years who met the DSM-5 criteria for OCD. Only those with a Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) score of 8 or higher, indicating at least mild symptom severity, were a part of this study. Individuals were excluded if they were immunocompromised (such as those with HIV infection or undergoing chemotherapy), had co-existing psychiatric conditions like major depressive disorder or psychosis, or had used antibiotics or corticosteroids in the two weeks before recruitment. These criteria ensured that the sample was not confounded by other factors influencing infection susceptibility or immune function.

Sample size

A total of 100 participants were recruited, divided equally into two groups: 50 OCD patients with recurrent infections and 50 without. Recurrent infection was defined as three or more documented infections in the past six months. The sample size was determined based on prior literature indicating moderate effect sizes in studies examining immune markers in psychiatric populations, with an assumed power of 80% and a significance level of 0.05.

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Bias

To minimize selection bias, participants were recruited consecutively from outpatient psychiatry clinics, and strict inclusion/exclusion criteria were applied. Blinding was applied during microbiological and biochemical analyses to reduce measurement bias. All data collectors received standardized training.

Parameters and data collection

Data collection covered psychiatric, clinical, microbiological, and biochemical domains. Psychiatric assessment was carried out using the Y-BOCS to quantify symptom severity. Clinical data were gathered using a structured questionnaire, including demographic details, medical history, and history of skin infections in the preceding 6 months. Microbiological samples were collected from relevant sites such as skin, throat, and urine, depending on the patient's infection history. These were analysed using gram staining, culture, and sensitivity testing to detect and identify potential pathogens. For biochemical analysis, blood samples were collected to measure serum cortisol, collected at 6.30 A.M., CRP, and IL-6, using chemiluminescence.

Data analysis

The collected data were analyzed using SPSS software (version 20). Descriptive statistics were used to summarize demographic and clinical data. While comparing biochemical markers between OCD patients with and without recurrent infections, a *p*-value of less than 0.05 was considered statistically significant.

Ethical considerations

Ethical approval for the study was obtained from the Institutional Ethics Committee. Participant confidentiality was maintained throughout the study, and all procedures adhered to ethical standards and institutional guidelines.

Results

During the study period from January 2023 to December 2023, a total of 138 patients with a provisional diagnosis of obsessive-compulsive disorder (OCD) were initially screened from the psychiatry outpatient department. Following a detailed assessment, 112 patients met the DSM-5 diagnostic criteria for OCD and had a Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) score of 8 or higher, qualifying them for inclusion in the study. However, 12 patients were excluded based on the predefined exclusion criteria—five were immunocompromised, four had co-existing psychiatric disorders such as major depression or psychosis, and three had used antibiotics or corticosteroids within the previous two weeks. After applying these criteria, 100 eligible participants were enrolled in the study. These participants were then categorized into two groups: 50 OCD patients with recurrent infections, defined as three or more documented infections in the previous six months, and 50 OCD patients without recurrent infections.

The baseline characteristics of the 100 OCD patients revealed a mean age of 29.4 ± 6.2 years, with a nearly equal gender distribution (26 males, 24 females). The average age of OCD onset was 19.5 ± 5.9 years, and most patients exhibited a chronic course of illness (83.3%). Progressive onset was more common (60%) than acute onset (40%), and 43.3% reported onset following stressful life events. Obsessive-compulsive personality traits were present in over half of the participants (55%). Patients with recurrent infections had higher Y-BOCS scores (23.1 ± 4.5) compared to those without infections (20.1 ± 4.4), suggesting greater OCD severity. Pharmacologically, SSRIs were the most commonly prescribed (61.7%), followed by clomipramine and benzodiazepines. Use of second-generation antipsychotics and mood stabilizers was less frequent, and only 20% of patients were receiving cognitive behavioural therapy. These findings indicate a clinically significant burden of OCD symptoms, with a potential link between illness severity and susceptibility to recurrent infections (Table 1).

Table 1. Demographics and baseline clinical characteristics, and treatments of OCD patients (N = 100)

Parameter	Total (N = 100)	With Recurrent Infections (n = 50)	Without Recurrent Infections (n = 50)
Age (years)	29.4 ± 6.2	29.8 ± 6.5	29.0 ± 6.0
Sex (M/F)	52/48	26/24	25/25
Age of OCD onset (years)	19.5 ± 5.9	18.9 ± 5.4	20.1 ± 6.2
Y-BOCS score	21.6 ± 4.8	23.1 ± 4.5	20.1 ± 4.4

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Course of Illness			
Episodic	34 (34%)	10 (20%)	11 (22 %)
Chronic	66 (66%)	40 (80 %)	39 (78 %)
Type of Onset			
Acute	40 (40%)	18 (36%)	21 (42 %)
Progressive	60 (60%)	32 (64 %)	29 (58 %)
Onset related to stress	43 (43 %)	23 (46 %)	20 (40 %)
Obsessive-compulsive personality traits	55 (55%)	30 (60%)	25 (50%)
Perinatal trauma history	23 (23 %)	15 (30%)	8 (16 %)
Current Pharmacological Treatment			
SSRIs	62 (62 %)	33 (66 %)	28 (56 %)
Clomipramine	25 (25 %)	13 (26 %)	11 (22 %)
Benzodiazepines	15 (15%)	20 (20%)	5 (10%)
SGAs	13 (13 %)	8 (16 %)	5 (10 %)
Mood stabilizers (e.g., valproate, lithium)	10 (10 %)	10 (10 %)	10 (10 %)
Psychotherapy (CBT)	20 (20 %)	10 (20 %)	10 (20 %)

The correlation analysis revealed significant associations between inflammatory markers and key clinical variables in OCD patients. Higher IL-6 levels were significantly correlated with greater OCD symptom severity (Y-BOCS score; $\beta = 0.325$, $p = 0.009$) and higher BMI percentiles ($\rho = 0.438$, $p = 0.016$), indicating a link between systemic inflammation, symptom burden, and body composition. IL-6 also showed near-significant associations with chronic illness course, perinatal trauma, and stress-related onset. Similarly, CRP was positively correlated with BMI percentile ($\rho = 0.424$, $p = 0.014$) and marginally with OCD severity. Cortisol levels showed a weak, non-significant correlation with Y-BOCS scores and were not associated with infection status. Notably, IL-6 levels were also significantly higher in patients with recurrent infections ($\beta = 0.304$, $p = 0.012$), supporting the role of inflammation in mediating the link between severe OCD symptoms and increased susceptibility to infections (Table 2).

Table 2. Correlation between biochemical parameters and clinical variables in OCD patients (N = 100)

Biochemical Marker	Clinical Variable	Correlation Coefficient	p-value
IL-6	Age	$\rho = 0.128$	0.192
	Sex (Male/Female)	$\beta = 0.074$	0.386
	Age of OCD onset	$\rho = -0.104$	0.274
	Y-BOCS score (OCD severity)	$\beta = 0.325$	0.009
	Chronic course of illness	$\beta = 0.198$	0.056
	Progressive onset	$\beta = 0.147$	0.113
	Onset following stress	$\beta = 0.167$	0.082
	Obsessive-compulsive personality traits	$\beta = 0.184$	0.066
	History of perinatal trauma	$\beta = 0.194$	0.058
	BMI percentile	$\rho = 0.438$	0.016
	Currently on SSRIs	$\beta = 0.109$	0.231
	Currently on clomipramine	$\beta = 0.132$	0.178
	Currently on benzodiazepines	$\beta = 0.171$	0.075
	Currently on SGAs	$\beta = 0.142$	0.139
	Currently on mood stabilizers	$\beta = 0.116$	0.214
	Currently receiving CBT	$\beta = -0.057$	0.484
	Presence of recurrent infections	$\beta = 0.304$	0.012

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CRP	BMI percentile	ρ = 0.424	0.014
	Y-BOCS score	β = 0.211	0.051
	Presence of recurrent infections	β = 0.162	0.094
	Age	ρ = 0.117	0.217
Cortisol (6:30 AM)	Y-BOCS score	ρ = 0.211	0.072
	Presence of recurrent infections	Not significant	> 0.05
	BMI percentile	ρ = 0.178	0.089
	Age	ρ = 0.154	0.101
	Onset following stress	β = 0.160	0.086

The results of the study revealed a notable association between the severity of obsessive-compulsive disorder (OCD) symptoms and the frequency of recurrent infections. Among the 50 OCD patients with documented infections, *Staphylococcus aureus* was the most frequently isolated pathogen (40%), primarily from skin samples, followed by *Escherichia coli* from urine (26.7%) and *Streptococcus pyogenes* from throat swabs (20%). Notably, patients with *Streptococcus pyogenes* and *S. aureus* infections had higher mean Y-BOCS scores (28.5 ± 5.1 and 27.8 ± 4.3, respectively), suggesting that increased symptom severity may contribute to behaviours—such as excessive washing—that compromise skin integrity and increase susceptibility to infection. These findings support the hypothesis that greater OCD severity is linked to higher infection risk, highlighting the need for integrated psychiatric and infection control interventions in this population (Table 3).

Table 3. Pathogens Isolated in OCD Patients with Recurrent Infections and Their Association with OCD Severity (n = 50)

Pathogen Identified	Site of Infection	No. of Patients (n = 50)	Mean Y-BOCS Score (± SD)
Staphylococcus aureus	Skin	20 (40 %)	27.8 ± 4.3
Escherichia coli	Urine	14 (28 %)	26.2 ± 3.9
Streptococcus pyogenes	Throat	10 (20 %)	28.5 ± 5.1
Candida albicans	Skin/Throat	6 (12 %)	25.4 ± 4.1
Total Positive Cultures		50 (100%)	—

Discussion

The present study observed a significant association between the severity of OCD symptoms and the frequency of recurrent infections. Specifically, patients with higher Y-BOCS scores exhibited a greater incidence of infections, with Staphylococcus aureus, Escherichia coli, and Streptococcus pyogenes being the most frequently isolated pathogens. These findings align with previous research wherein a past Epstein-Barr virus (EBV) infection was significantly associated with higher severity of OCD symptoms, particularly increased Y-BOCS scores and compulsions. Additionally, vitamin D insufficiency was linked to greater OCD symptom severity, suggesting a potential role of infections and nutrient deficiencies in exacerbating OCD [14]. The present study's results emphasize the need for clinicians to consider the potential for recurrent infections in the management of OCD, particularly in those with more severe symptoms.

In terms of biochemical stress markers, the study found elevated levels of IL-6 and IL-1β in patients with severe OCD, indicating an activated inflammatory response. These findings are consistent with previous studies that have linked OCD to systemic inflammation and immune dysregulation [15,16]. Additionally, the significant correlation between body mass index (BMI) percentile and levels of IL-6 and CRP further supports the role of systemic inflammation in the pathology of OCD. Earlier studies have suggested that a higher BMI may exacerbate inflammatory processes, which might potentially contribute to the severity of psychiatric conditions like OCD [17,18].

The microbiological findings in the present study are consistent with the literature that reports higher rates of infections in OCD patients, in contrast to healthy adults. For instance, a recent study identified an increased incidence of respiratory infections in OCD patients, while others found higher incidences of skin infections in this group [19,20]. These studies support the hypothesis that the behavioral and physiological aspects of OCD, such as compulsive cleaning and skin irritation, may predispose individuals to recurrent infections. The current study, along with these previous investigations, highlights the

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importance of integrated treatment approaches, considering both the psychiatric and physical health aspects of OCD.

Generalizability

The findings of this study may be cautiously generalized to adult OCD patients attending psychiatric clinics in similar tertiary care settings, though results may not apply to community-based populations.

Conclusion

The findings of this study indicate a significant association between the severity of OCD symptoms and the frequency of recurrent infections, with inflammatory markers such as IL6 playing a potential mediating role. OCD patients with recurrent infections demonstrated higher Y-BOCS scores, suggesting that infection susceptibility may be linked to increased symptom severity. These findings highlight the need for integrated psychiatric and infection control strategies in the management of OCD. The identification of pathogens such as Staphylococcus aureus, Escherichia coli, and Streptococcus pyogenes, along with elevated inflammatory markers like IL-6, further supports the hypothesis that immune dysregulation may contribute to the exacerbation of OCD symptoms. However, further research is needed to explore the underlying mechanisms and potential therapeutic strategies for addressing both the psychiatric and immune components of OCD.

Limitations

The study was limited by its cross-sectional design, relatively small sample size, and single-center setting, which may restrict the broader applicability of the findings.

Recommendations

It is recommended that OCD management protocols incorporate routine screening for recurrent infections and inflammatory markers such as IL-6 to ensure integrated care.

Acknowledgement

The authors sincerely acknowledge the support of the Departments of Psychiatry, Microbiology, and Biochemistry, Dharanidhar Medical College and Hospital, and all study participants.

List of abbreviations

DSM-5 – Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
OCD Obsessive-Compulsive Disorder
Y-BOCS – Yale-Brown Obsessive-Compulsive Scale
IL-6 – Interleukin-6
CRP – C-reactive Protein
CBT – Cognitive Behavioral Therapy
SSRI – Selective Serotonin Reuptake Inhibitor
SGA – Second-Generation Antipsychotic
BMI – Body Mass Index
SPSS – Statistical Package for the Social Sciences

Source of funding

The study did not receive any specific grant or financial assistance from funding agencies.

Conflict of interest

The authors declare no conflict of interest.

Author biography

The authors are faculty and postgraduate researchers from the Departments of Psychiatry, Microbiology, and Biochemistry at Dharanidhar Medical College and Hospital, with active involvement in neuropsychiatric and immunological research.

Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Author contributions

All authors contributed equally to study conception, data collection, analysis, manuscript drafting, and final approval of the manuscript.

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https://doi.org/10.51168/sjhrafrica.v6i6.1912
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Vol.6 No. 6 (2025): June 2025 Issue
https://doi.org/10.51168/sjhrafrica.v6i6.1912
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PUBLISHER DETAILS

Student's Journal of Health Research (SJHR)
(ISSN 2709-9997) Online
(ISSN 3006-1059) Print
Category: Non-Governmental & Non-profit Organization
Email: studentsjournal2020@gmail.com
WhatsApp: +256 775 434 261
Location: Scholar's Summit Nakigalala, P. O. Box 701432, Entebbe Uganda, East Africa