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Systematic Review

A Systematic Review on the Prevalence of Comorbid Substance Use Disorder in Obsessive–Compulsive Disorder Among the General Population

Adeola Y. Akosile [1,*], Babangida Tiyatiye [2] and Wole Akosile [3]

[1] Child and Youth Mental Health Service, Children's Health Queensland, Brisbane, QLD 4101, Australia
[2] Department of Psychiatry, The University of Western Australia Medical School, Perth, WA 6009, Australia; babangida.tiyatiye@uwa.edu.au
[3] National Centre for Youth Substance Use Research, Faculty of Health and Behavioural Sciences, The University of Queensland, Brisbane, QLD 4072, Australia; oluwaseun.akosile@uq.edu.au
* Correspondence: adeola.akosile@health.qld.gov.au

Abstract: Background: To estimate the prevalence of co-occurring obsessive–compulsive disorder (OCD) with substance use disorder (SUD) in the general population. Methods: A comprehensive literature search was conducted on the prevalence of comorbid OCD and SUD in the general population using MEDLINE, PsycINFO, EMBASE and CINAHL. Using the keywords, relevant studies published between 1993 and 2021 were identified. These studies were analysed using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines and the guidelines for Meta-analysis for Observational Studies in Epidemiology. Results: Fourteen studies met the inclusion criteria and had a total combined sample size of 47,850 participants. The lifetime prevalence of any identified SUD in patients with OCD ranged between 4.3% and 62.4%. Among co-occurring OCD with AUD, prevalence ranged between 14.1% and 35.9%; cannabis use disorder and OCD, between 11.5% and 24.4%; and tobacco use disorder and OCD, between 15% and 23.1%. Alcohol was the commonest psychoactive substance used in most of the studies reviewed and the prevalence of co-occurring substance use was highest in males. Conclusions: In conclusion, this review highlights the variable prevalence of co-occurring SUDs in individuals with OCD, emphasizing that the association differs based on the type of substance. Overall, the prevalence rate of co-occurring OCD and SUDs underscores the need for further research on the relationship between these conditions and the development of effective treatment strategies that address both disorders concurrently.

Keywords: obsessive–compulsive disorder; substance use; epidemiology

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1. Introduction

The co-occurrence of obsessive–compulsive disorder (OCD) and substance use disorders (SUDs) is a well-documented phenomenon. The interconnectedness of these conditions among individuals in the clinical population has been previously reported [1,2]. While OCD is characterized by internalizing behaviours such as obsessions and compulsions, SUDs are typified by their externalizing behaviours associated with poor impulse control and risk-taking behaviours [3,4].

Individuals with OCD and SUDs often exhibit overlapping phenomenology, such as ritualistic behaviours, negative reinforcement, intrusive thoughts, and heightened anxiety [5]. Individuals affected by these disorders tend to engage in recurring patterns of

behaviours to alleviate their distress [5,6]. These behaviours temporarily alleviate distress and suppress negative affect [6,7]. However, the distress inevitably returns, triggering a cycle of rituals aimed to seek relief from the negative affect [6].

OCD is a debilitating mental illness that often coexists with SUD and other comorbid conditions, significantly impairing the overall functioning of affected individuals [1,2,8]. Previous studies have demonstrated that individuals with OCD are at greater risk of developing SUDs with reference to alcohol, tobacco and drug use [1,9–12]. These could suggest a likely shared neuronal pathway in both disorders. One common aspect between OCD and SUDs is the dysregulation of the brain's dopamine pathway in the striatum and prefrontal cortex [13]. Additionally, abnormalities in the cortico–striatal circuitry and the striato–thalamic networks have been implicated in this comorbidity [13,14]. Dysfunction in the dorsal anterior cingulate cortex (ACC), which is involved in cognitive flexibility, inhibition control, and attentional control, has also been observed in individuals with both OCD and SUDs [15]. This dysfunction mediates difficulties in cognitive flexibility, inhibition control and attentional control. Understanding and exploring the evidence for this relationship can contribute to the advancement of treatment strategies and improved outcomes for individuals with co-occurring OCD and SUDs.

Studies have reported that the prevalence of OCD is estimated to range from 1% to 2.3%, with a lifetime prevalence estimated between 2% and 3% [12,16–18]. On the other hand, the prevalence of SUDs tends to be more variable [19]. Among SUDs, nicotine use disorders exhibit the highest prevalence reported at approximately 20%. Alcohol use disorders also have a relatively high prevalence, estimated at 5.1% [19]. Clinical studies have consistently reported a similar prevalence of SUDs in individuals with OCD compared to the general population [11,20]. It is worth noting that these prevalence rates may vary depending on the studied population [2,11,20].

There is limited information regarding the co-occurrence of OCD and SUDs in clinical settings [2]. Their systematic review highlighted the scarcity of data on this subject but reported an average prevalence rate of comorbid SUDs at 50% in clinical samples. Alcohol use disorder (AUD) was the most prevalent SUD at 66.7%, followed by cannabis use disorder (CUD) at 5.3%, and opioid use disorder (OUD) at 1.5% in clinical settings [2]. The relationship between OCD and SUDs in the general population remains poorly understood, necessitating further research to quantify the extent of these issues [2,3].

The co-occurrence of OCD and SUDs can have a negative impact on the progression of the illnesses and the overall functioning of individuals [1,9,11]. In order to develop effective treatment strategies and implement early interventions programs, it is crucial to estimate the prevalence of OCD and SUDs, the additional challenges they face such as co-occurring depression, which further complicates treatment approaches and leads to poorer functional outcomes [1,21]. In addition, studying the prevalence rate in the general population provides valuable insights into the scope, impact, and implications of comorbid OCD and SUDs. This knowledge informs treatment planning, early intervention strategies, and resource allocation, ultimately contributing to improved clinical care and public health outcomes.

Our aim is to conduct a systematic review to ascertain the prevalence of OCD and SUDs in the general population. Through an examination of the existing evidence, our objective is to enhance the understanding of the prevalence and impact of SUDs in individuals with OCD within the general population.

2. Materials and Methods

This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines [22,23] and the guidelines for Meta-analysis for Observational Studies in Epidemiology (MOOSE) [24]. The protocol for this systematic review was pre-registered and is available on PROSPERO (title: A systematic review and meta-analysis on the prevalence of Comorbid substance use disorder in obsessive–compulsive disorder among the general population [CRD42023439109].

During data analysis, the authors found variations and heterogenicity amongst the papers, limiting a meta-analysis.

2.1. Data Sources and Search Strategy

A computer-based search of MEDLINE, PsycINFO, EMBASE and CINAHL was conducted in July 2021 by AW and BT. Further search of the database was conducted by AA in May 2022. Medical Subject Headings or free text (key words) were used to reflect differences in indexing among databases. Only studies appearing in peer-reviewed journals were included, because of the difficulty in searching and obtaining non-peer-reviewed literature, due to a potential risk of bias and variable quality [25]. Abstracts, opinion pieces and conference papers were excluded for the same reasons.

The search was limited to English language publications on humans, published between 1990 and 2021. Hand searches of the bibliographies of review articles focusing on SUDS and OCD were also conducted to identify additional records. Further search was conducted using PREMEDLINE and MEDLINE daily update (PUBMED) using the above keywords for any new literature. All search results were entered into EndNote (Version X20, Thompson Reuters) to aid in identification of duplicates and organisation of the source material based on the selection criteria, below.

2.2. Selection Criteria

Two raters independently excluded source material in the first and subsequent rounds that was not relevant to this review. First-round exclusions were based on the article's title and abstract. Any disagreement between raters or uncertainty about excluding the source led to the full article being assessed in the next round. Sources were chosen on the basis that they contained original research (review papers were excluded) in epidemiological (household surveys were excluded) or clinical populations (in- or outpatient settings). Studies using well-recognised screening tools such as the Alcohol Use Disorders Identification Test (AUDIT) to identify a SUD in subjects with OCD were also included. Studies using non-standardised diagnostic criteria for substance use (e.g., heavy, or former drinkers) or psychiatric illness not based on structured diagnostic instruments (DSM-III-R to DSM-5, ICD-8 to ICD-10) were also excluded, as were those based on clinician or self-reports.

Studies reporting prevalence rates for SUDs or OCD separately were excluded as the prevalence of comorbidity required both a psychiatric and SUD diagnosis within a defined population. Those employing study enrolment based on current or history of a SUD (common for many randomised control trials and some follow-up studies) were excluded because of selection bias. Any disagreements were resolved between the raters.

2.3. Data Extraction

The following information was extracted in the second round in a semi-structured form: name of study, location, authors, title, journal, year study conducted, sample size, the use of structured or semi-structured methods for proving the diagnosis of substance use and OCD, study population (random sample or consecutive admissions to in- or outpatient clinic) and setting (inpatient, outpatient/community or mix).

2.4. Risk of Bias Assessment

Using a tool developed by Hoy et al., 2012 [26], for prevalent studies, A.A. and B.T. independently assessed the risk for bias. Any disagreement between them was further reviewed by (A.W.).

The risk of bias tool is composed of ten items assessing external (selection and non-response bias) and internal validity (measurement bias and bias related to errors in analysis) and a summary item on the overall risk of study bias as shown in Table 2.

Individual items are assessed as having a low or high risk of bias, and the summary item is assessed as having a low, medium, or high overall risk of bias if further research is very unlikely, likely, or very likely to change the estimate, respectively. All included studies were assessed for risk of bias independently by two reviewers and a third reviewer when required. This is shown in Table 2.

3. Results

3.1. Literature Search

The search resulted in a total of 5077 relevant research articles after removing duplicates. After review of abstracts and titles, a total of 2138 articles were excluded. One hundred and eighty papers were retrieved and assessed for eligibility. Using the inclusion and exclusion criteria, the search identified 14 studies, which were included in the systematic review. The PRISMA flow chart for the included studies is presented in Figure 1.

3.2. Included Studies

Of these 14 studies, 4 were conducted in USA, 2 in Canada, 1 in Asia, 4 in the European Union, 1 in Mexico, 1 in New Zealand and 1 in Britain. The study size ranged from 37 to 38,157 participants with a study period from 1993 to 2021. Eleven of the studies were cross-sectional studies and three were prospective studies.

The largest study (n = 38,157) was conducted among US veterans with OCD with a prevalence of 36.7% (N = 14,02) of comorbid SUD [1]. Among the included studies, 3 studies were in various clinical settings while 11 studies were conducted on the general population, which includes population-based registry, colleges, and the community.

3.3. Study Demographic Variables

The total population of the study participants is 47,850. Difference prevalence rates were estimated for comorbid substance use and OCD among the participants in this study. Comorbid SUD and OCD were 33% (n = 15,775) and 0.5% (n = 252) among AUD and OCD. Comorbid CUD and OCD and tobacco use disorder and OCD were negligible with a total of n = 42 (0.09%) and 32 (0.067%), respectively. Some studies included the entirety of SUD co-existing with OCD, whereas a limited number of studies focused on specific substance use like CUD and AUD, and two studies considered tobacco use disorder. This is reflected by the variation in inclusion criteria for the different types of SUDs analysed.

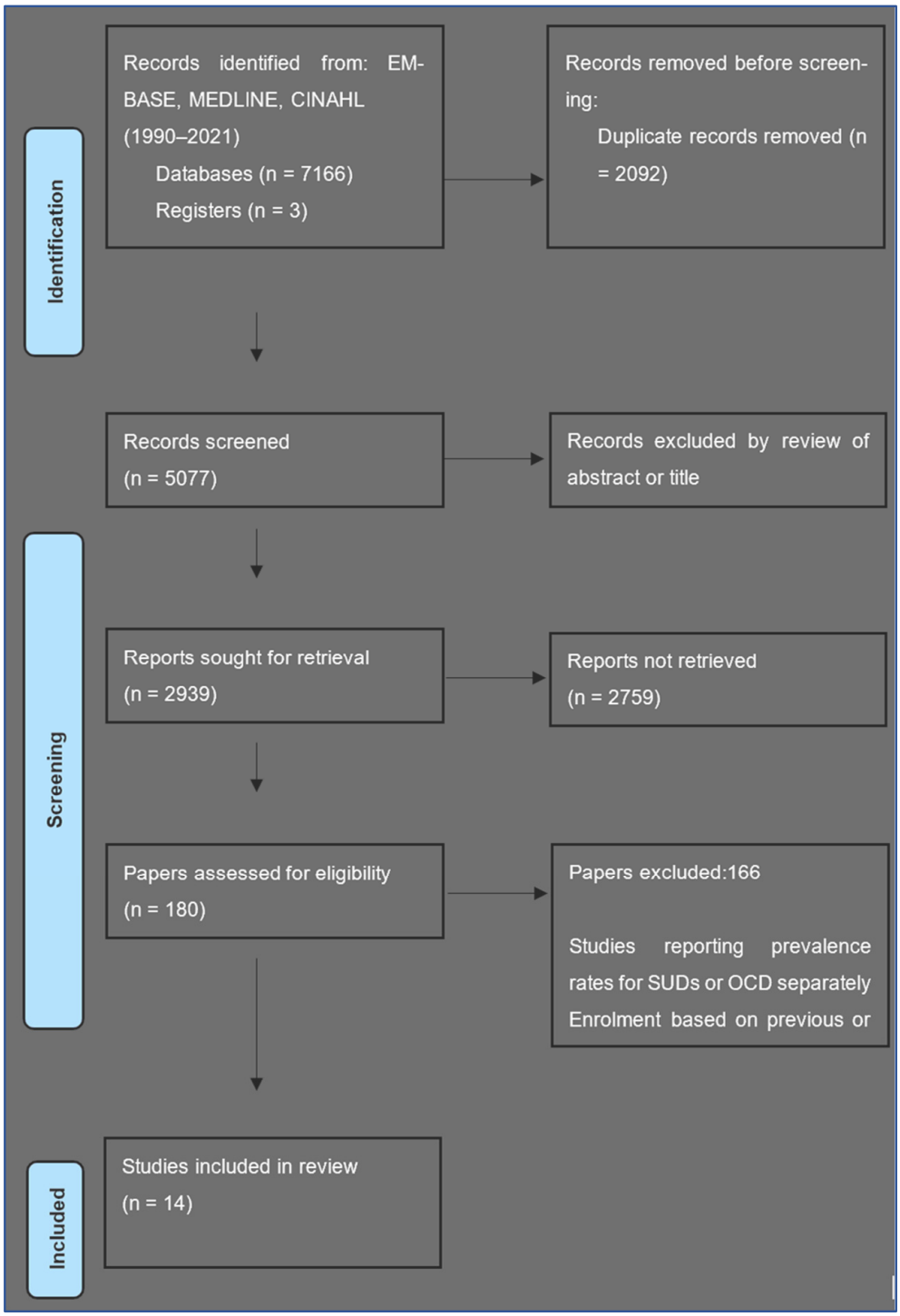

Figure 1. Flow diagram of search outcome and screening for included studies.

Most of the participants were adults with age ranging between 18 and 65 years. Few studies included age as low as 5 and above the age of 65.

Onset of OCD was higher among females than males. However, comorbid substance use was significantly higher among males than females with a ratio of 4:1 among the total study participants. This correlates with past evidence reporting a higher prevalence of OCD among females; however, when comorbidity with SUDS was considered, it was reported to be higher among males [3,11,27]. A study conducted in the clinical setting observed a gender disparity, with a notably higher representation of male Veteran participants, comprising 82.2% of the included population [1]. Conversely, female participants were notably

underrepresented in this study. This observation is similar with findings from a general population study conducted in Denmark in 2016 by Toftdahl, Nordentoft and Hjorthoj [28], which also noted an overrepresentation of males among patients with comorbid SUDs. Although other types of SUD were considered, it is worth highlighting that the prevalence of co-occurring tranquilizer use and OCD was higher among female participants. Torres et al. reported a prevalence rate of 3.3% in their research conducted in 2000 [27].

Gender differences were observed in the prevalence of OCD, with studies indicating a higher likelihood of occurrence among women [8,11,29]. This aligns with established findings in the previous literature, while three studies among the included studies reported no discernible gender variations [9,30,31].

A study conducted among college students in India on the co-occurrence of OCD and AUD revealed a higher prevalence among men [32]. This could indicate that when considering comorbid SUD and OCD, gender disparities occur, with men exhibiting higher prevalence rates.

Only a few studies have delved into the relationship between the socioeconomic status and comorbid OCD and SUD. Evidence by Osland, Arnold and Pringsheim in 2018 reported that individuals with co-occurring OCD and SUD tend to have lower household incomes [8]. Another study conducted by Adam et al. in 2012 reported that symptoms of OCD were more pronounced among unemployed individuals compared to those who are employed [9]. However, it is important to note that this study did not specifically account for comorbid cases of OCD and SUD.

3.4. The Prevalence Rate of OCD and SUD

Thirteen studies assessed comorbid OCD and SUD, AUD or CUD and one study focused on obsessive–compulsive symptoms. This is shown in Table 1.

Many of the studies reported prevalence rates for one or two of alcohol use disorder (AUD), SUD and other illicit substance use like CUD. The lifetime prevalence rate of comorbid OCD with SUD varied between 4.3% and 55.6% depending on which substance was used.

3.5. Comorbid OCD and Alcohol Use Disorder (AUD)

Among the included studies, a total of eight studies focused on the co-occurrence of AUD and OCD. This contrasts with a larger group of studies (n = 11) that discussed SUD more broadly, encompassing a range of substance-related conditions under the umbrella term "illicit substance use". Among the studies that focused on specific substance use, AUD emerged as the most frequently reported comorbid SUD with OCD, with a total of 252 included participants.

The lifetime prevalence of comorbid OCD and AUD ranged between 21.3% and 35.9% among the included studies. These studies were primary population-based studies with one study conducted as part of a community mental health survey [8]. The study samples ranged from 30 to 420, with two of the studies having a sample size greater than 250 [8,11].

Table 1. Descriptive characteristics of the studies included in the review.

No	Name of Study/Author	Design Type	City/State/Country	OCD Sample Size/Age Range	Diagnostic Tool Used	Prevalence of OCD and Lifetime SUD	Ethnicity	Gender Differences	Risk of Bias
1	Cannabis Use in People With Obsessive–Compulsive Symptomatology: Results From a Mexican Epidemiological Sample Nicolini H et al., 2021 [33]	Cross sectional	Mexico	*N* = 288 (OCS) Cannabis use Age range 12–65 years	DI-PAD CIDI	Prevalence of cannabis dependence in people with OCS (4.3%, n = 12)	Mexican	OCS: Male—122 (42.3%) Female—166 (57.7%)	Lack of direct psychiatric evaluation of individuals surveyed due to limited study Inability to conduct a longitudinal evaluation of OCD symptoms before or after use of cannabis Evaluated only the use of cannabis and not dependence with the genetic risk analysis Low risk of bias
2	Co-occurrence of Obsessive–Compulsive Disorder and Substance use disorders among U.S veterans: Prevalence and mental health utilization Ecker A.H et al. 2019 [1]	Cross-sectional (retrospective) Veterans with OCD diagnosis from 2010 to 2016	United States	*N* = 38,157 (OCD)	Veterans' Health Administration (VHA) administrative data from 2010 to 2016 ICD-9-CM and ICD10 AUDIT-C PHQ-2	Prevalence of SUD with OCD (N = 14,002) 36.70% have a comorbid SUD diagnosis	Majority White, African Americans 11.3%, American Indian 1.0%, Asian 1.1%, Native Hawaiian 1%, Hispanic 6.3% and 6.6% ethnicity was unknown	82% (31,365) of patients were male and 18% (6792) female with OCD Gender prevalence of comorbid SUD not specified	OCD diagnosis was given in routine clinical practice and the validity cannot be determined given a lack of standardized assessment Women and ethnic minorities were underrepresented Study was limited to veterans with OCD diagnosis Results reflected when diagnosis were assigned not the onset of the disorder Many veterans did not have PHQ-2 or AUDIT-C screenings Moderate bias

Table 1. *Cont.*

No	Name of Study/Author	Design Type	City/State/Country	OCD Sample Size/Age Range	Diagnostic Tool Used	Prevalence of OCD and Lifetime SUD	Ethnicity	Gender Differences	Risk of Bias
3	The prevalence of diagnosed obsessive–compulsive disorder and associated comorbidities: A population-based Canadian study (Osland S., Arnorld PD., & Pringshein T., 2018) [8]	Cross-sectional Study Subject data obtained from Canadian Community Health Survey—CCHS-Mental Health survey in 2012	Canada	*N* = 267	Canadian Community Health Survey—CCHS-Mental Health	Alcohol abuse or dependence—31.67% Substance abuse or dependence—35.98%	Canadians	Estimated prevalence in OCD Female population = 1.04% Male population = 0.81% Gender prevalence of comorbid SUD not specified	Study was relied on self-report of OCD symptoms diagnosed by health professional therefore limits the prevalence of diagnosed OCD in Canadian populations The Statistics Canada surveys did not include institutionalized individual which could have underestimated the prevalence of diagnosed OCD High bias
4	Prevalence and correlates of obsessive–compulsive disorder and subthreshold OCD disorder among college student as in Kerala, India Jaisoorya, et al.; 2017 [32]	Cross-sectional survey	Ernakulam, Kerala, India	*N*= 164 (OCD) (age range 18–25 years)	CIS-R, CIDI ASSIST ICD-10	point prevalence of OCD was 3.3% (males = 3.5%; females = 3.2%) Alcohol use + OCD = 58 Tobacco use + OCD = 25 (Total SUD = 83) Prevalence: Alcohol + OCD = 35.7% Tobacco + OCD = 15%	Indian	OCD = 61 (3.5%) were males and 103 (3.2%) were females Gender prevalence of comorbid SUD not specified	OCD diagnosis was based only on the self-reported response with no diagnostic interview which can affect the estimate of prevalence Cross-sectional design may affect the cause and effect of OCD, subthreshold OCD and variables measured High prevalence rates of lifetime alcohol amongst OCD might have increased the high rate of comorbid alcohol High bias

Table 1. *Cont.*

No	Name of Study/Author	Design Type	City/State/Country	OCD Sample Size/Age Range	Diagnostic Tool Used	Prevalence of OCD and Lifetime SUD	Ethnicity	Gender Differences	Risk of Bias
5	Prevalence of substance use disorders in psychiatric patients: a nationwide Danish population-based study Toftdahl, Nordentoft & Hjorthoj; 2016 [28]	Prospective design Mental health register from 1969	Denmark	*N* = 5953	Data from Danish population registrar ICD-8 (from 1969 to 1993) ICD-10	Lifetime prevalence of SUD + OCD = 11% (SUD = 655)	Greater and equal to 16	Patients with SUD were mostly the male gender with a prevalence of 56% (381) Female 54% (299)	All data of the included individuals were not obtainable due to the availability of the registrar The register only contained diagnosis obtained in public health care settings, an unknown number of cases of SUD was not diagnosed Crude prevalence was of being diagnosed with a psychiatry disorder was provided and having a possible SUD independent of time with no clarification co-occurring or comorbid SUDs Moderate bias
6	Obsessive– Compulsive disorder in the community: 12-month prevalence, comorbidity and impairment Adam, Y., Meinlschmidt, G., Gloster, A. T., & Lieb, R. (2012) [9].	Cross-sectional study Survey subjects living in Germany in 1997	Germany	*N* = 30 (Age range 18–65 years	GHS-MHS CID-S DIA-X/M-CIDI DSM-IV	12-month prevalence of SUD and OCD Any substance abuse/dependence -30% (9) Alcohol abuse/dependence 14.1% (4) Nicotine dependence 23.1% (7) Any Illicit Substance 1.9% (1)	German	No gender differences re: 12 months Gender prevalence of comorbid SUD not specified	GHS-MHS data were based on self reports Analysis of OCD comorbidity were small due to the number of subjects with DSM-IV OCD Several disorders related to OCD such as body dysmorphic disorder and pathological grooming habits were not included Lifetime SUD/OCD not specified Moderate risk

Table 1. *Cont.*

No	Name of Study/Author	Design Type	City/State/Country	OCD Sample Size/Age Range	Diagnostic Tool Used	Prevalence of OCD and Lifetime SUD	Ethnicity	Gender Differences	Risk of Bias
7	Co-occurrence of obsessive–compulsive disorder and substance use disorder in the general population Blom et al., 2011 [3]	Cross-sectional Data from 1996	The Netherlands	OCD = 61 Age range (18–64 years)	Composite International Diagnostic Interview (CIDI) 1.1 DSM-III-R Netherlands Mental Health Survey and Incidence Study (NEMESIS).	Life time prevalence (SUD and OCD) Men -Any SUD + OCD 55.6% Women -Any SUD + OCD 23.5%	Dutch	(Men—29, Women—32) Comorbid OCD and SUD is higher in male	OCD and SUD relation in the general population were based on relatively small numbers especially subdivided by gender AXIS 1 disorders were considered as comorbid which could have underestimated the co-occurrence of psychiatric disorders and substance use disorder Low bias
8	The epidemiology of obsessive–compulsive disorder in the National Comorbidity Survey Replication Ruscio A.M et al. 2010 [12]	Cross-sectional study	United States	*N* = 2073 (adults 18 and over)	Y-BOCD CIDI 3.0, SCID	Lifetime prevalence for OCD = 2.3% Prevalence of OCD + SUD = 38.6% (n = 800)	English speaking households	Gender prevalence of comorbid SUD not specified	Regression-based imputation was used to assign diagnosis to respondents that were unable to be re-interviewed Small sample size due to the low prevalence of OCD High bias
9	A comparative study of obsessive–compulsive disorder in Costa Rica and the United States Chavira et al., 2008 [30]	Cross-sectional study	Latin-America and North America	*N* = 78 (Costa Rica = 26, US = 52) Ages between 5 and 18	YBOCS, DIGS (for adults), KSADS-PL (for children), DSM-IV	Costa Rican Alcohol use disorder—3.8% Cannabis use disorder—0% Other SUD—0% United States Alcohol use disorder—21.3% Cannabis use disorder—19.1% Other SUD—39.4%	Latin Americans	Age distribution was similar across gender (male and female) Costa Rica—female 50%/male 50% (13 each) US—female 64% (33), male 36% (32) Gender prevalence of comorbid SUD not specified	Small study size Low to moderate bias

Table 1. *Cont.*

No	Name of Study/Author	Design Type	City/State/Country	OCD Sample Size/Age Range	Diagnostic Tool Used	Prevalence of OCD and Lifetime SUD	Ethnicity	Gender Differences	Risk of Bias
10	Obsessive–compulsive disorder: prevalence, comorbidity, impact and help seeking in the British National Psychiatry Morbidity Survey of 2000 Torres AR et al., 2006 [27]	Cross-sectional study Data from British National Psychiatric Survey	Britain	*N* = 114 Age: 16–74 years	CIS-R using ICD 10	Any drug dependence—25.6% Cannabis dependence—11.5% Alcohol dependence/hazardous use—34.7% Amphetamine dependence 2.1%, Ectasy dependence 4.6%, Cocaine dependence 2.1%	Adults in private household in England, Wales and Scotland	Prevalence of comorbid SUD is higher in men Alcohol Men—33.3% Women—11.7% Substance dependence Men—20.3% Women—9.2%	Small participants (114) with OCD in study Use of lay interviewers and structures interview could overestimate the severity of OCD Cross-sectional design does not allow inferences on lifetime psychopathology Based on self-reports of substance use High bias
11	Axis I and II comorbidity in a large sample of patients with obsessive–compulsive disorder Denys D. et al., 2002 [11]	Cross-sectional study from 1997 to 2002	Utretcht, The Netherlands	*N* = 420	M.I.N.I, GAF, Y-BOCS, HDRS, HAS	Prevalence for alcohol dependence—1.5% Substance-related disorders—4.3%		Predominantly female population with OCD (62% n = 260) Male 38% n = 160) Gender prevalence of comorbid SUD not specified	Study limited to results from a psychiatry department specialized in anxiety which might underestimate rate of comorbid diagnosis and a low prevalence rate of substance dependence Low bias
12	Obsessive– Compulsive Disorder in a birth Cohort of 18- Year- Olds: Prevalence and Predictors Douglass et al., 1995 [29]	Longitudinal study Cohort of consecutive births between 1st of April 1972 and 31st March 1973 follow-up till age 18 in 1990–1991	Otago, New Zealand	*N* = 37 Age = 18 years Male and female N = male 15, female 22) (male:female ratio of 0.7:1)	DIS (version III-R) DISC-C (Version XIII-III)	Comorbidity with OCD Alcohol dependence—24% Marijuana dependence—19%	Predominantly European, 7% identified themselves as Maori or Polynesian at age 18	Male—female ratio 0.7:1 patients with OCD Prevalence of comorbid SUD and OCD Marijuana Male—27% Female—14% Alcohol Male—33% Female—18%	DIS was used to gather information for DSM-III-R diagnosis however detailed information like the severity, impairment in function and duration were not obtained Low to moderate risk of bias

Table 1. *Cont.*

No	Name of Study/Author	Design Type	City/State/Country	OCD Sample Size/Age Range	Diagnostic Tool Used	Prevalence of OCD and Lifetime SUD	Ethnicity	Gender Differences	Risk of Bias
13	Epidemiology of Psychiatric disorders in Edmonton, Obsessive–Compulsive Disorder Kolada J., Bland RC., & Newman S., 1994 [31]	Cross-sectional Study	Edmonton, Canada	*N* = 103 Age = 18 years and over	DIS DSM-III General health Questionnaire	Prevalence SUD with OCD = 62.4% -Alcohol—35.9% -Drug abuse—26.5%	Canadians living in Edmonton	OCD is equally prevalent in both genders Gender prevalence of comorbid SUD not specified	Most of this study was carried out by chat review or patients reporting on their family with no personal interviews There was paucity of controlled investigations High bias
14	Cocaine use and other suspected risk factors for obsessive–compulsive disorder: a prospective study with data from the Epidemiologic Catchment Area surveys Crum, R. M., & Anthony, J. C. (1993) [10].	Prospective study Probability samples were selected in 1980–1984	USA—(5 metropolitan area) Connecticut, Maryland, Missouri, North Carolina, California	*N* = 105	DIS which was modelled after DSM-III	Prevalence SUD + OCD = 21.9% (SUD amongst OCD = 23)	Americans	Female (n = 77, 73%), male (n = 28, 27%)	The sample suffered some attrition between baseline interview and sampling and between baseline and follow-up 1 year later The 1 year follow-up interval may not be optimal for studying onset of OCD in relation to cocaine exposure DIS diagnosis for OCD might be over-inclusive and might not include cocaine-induced obsessions or compulsions The ECA measurements were solely self-report and a validity check with bioassays was not possible This study focused on the use of cocaine and cocaine and marijuana use Low to moderate bias

BOCS: Yale–Brown Obsessive–Compulsive Scale; CIS-R: Clinical Interview Schedule-Revised; DI-PAD 0 Diagnostic Interview for Psychosis and Affective Disorders; CIDI—Composite International Diagnostic Interview; ASSIST: Alcohol, smoking, and Substance Involvement Screening Test; GHS-MHS: German National Health Interview and Examination Survey–Mental Health Supplement: DIA-X/M-CIDI: DIGS: Diagnostic Interview for Genetic Studies, KSADS-PL: Kiddie Schedule for Affective Disorders and Schizophrenia; SUD: Substance use abuse; LHID2000: Longitudinal Health Insurance Database 2000; M.I.N.I (Mini International Neuropsychiatric Interview); GAF: Global assessment of functioning scale; HDRS (Hamilton Depressive Rating Scale); HAS (Hamilton Anxiety Scale); SCID (Structured Clinical Interview for DSM-IV; OCI-R: Obsessive–compulsive inventory-revised; RFS: Reason for smoking scale; FTCD: The Fagerstrom Test for Cigarette Dependence; SHQ: Smoking History Questionnaire; AUDIT-C: Alcohol Use Identification Test-Consumption; PHQ-2: Patient Health Questionnaire: DISC-C: Diagnostic Interview Schedule for Children, ICD-9-CM: International Classification of Diseases, ninth edition, Clinician Modification; DSM-III: Diagnostic and Statistical Manual of Mental Disorders, Third Edition.

Additionally, a cross-sectional study conducted among college student in India reported high baseline prevalence rates of lifetime alcohol use of 19.6% [32]. This elevated rate could be a significant factor contributing to the higher reported prevalence of comorbid AUD and OCD in this specific population. This finding correlates with past evidence, which indicated that comorbid AUD and SUD constitutes the largest population when compared with CUD and tobacco use disorder. These may include the easy accessibility to alcohol in the society, its use in social gatherings, legal and cultural acceptance of use. Additionally, individuals with OCD have a higher prevalence of AUD compared to the general population, with approximately 24% of those with OCD meeting the criteria for an AUD at some point in their lives [34]. Secondly, cannabis effects are less predictable and can sometimes exacerbate anxiety and paranoia, which may deter its use in this population [35].

In a comparative analysis, a study found that substance-related disorders, especially alcohol abuse, occurred less frequently in OCD patients when contrasted with the general population [11].

3.6. Comorbid OCD and SUD

Eleven of the studies included in the analysis reported the co-occurrence of SUD among individuals with OCD, constituting a significant proportion at 78.6% of the studies considered. This relatively high rate could be attributed to the fact that many of these studies adopted a broad definition of substance use, encompassing various forms if illicit drug use under the term "substance use". This inclusive approach likely contributed to the higher prevalence of comorbid SUD and OCD within these studies.

Among the 11 studies, 8 studies were population based, with a lifetime prevalence rate ranging from 11% to 62.4%. In contrast, the clinical/outpatient-based studies reported a similar prevalence of approximately 35.98% and 36.7%. However, there was an exception in one clinical population study conducted in the Netherlands, which reported a notably lower prevalence rate of 4.3% [11].

3.7. Comorbid OCD and Cannabis Use Disorder

Four studies conducted studies on the lifetime prevalence of comorbid OCD and cannabis use disorder [27–30,33]. The prevalence rate of these studies ranged from 19% to 20.2%. All four studies found that CUDs were more common in persons with OCD than neurotic disorders (anxiety, depression, hypomania). Furthermore, one of the studies found that the polygenic risk score (PRS) for cannabis dependence was greater in those with OCD who used cannabis than those who did not use it. Two of the studies also found that cannabis use disorder and all forms of SUD were 3–4-fold more common in men than in women with OCD [27,33].

3.8. Comorbid OCD and Nicotine Dependence

A cross-sectional study of a 12-month prevalence of OCD conducted on a subsample of the German Health Survey (GHS) reported nicotine dependence as a higher comorbidity when comparing AUD with OCD with a OR that was 2.9 and statistically significant ($p < 0.05$). One study reported tobacco use disorder as the most common SUD co-occurring with OCD, followed by AUD [1].

Table 2. Risk of bias.

Studies	External Validity					Internal Validity				
	1	2	3	4	5	6	7	8	9	10
[33]	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
[1]	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes
[8]	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
[32]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
[28]	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes
[9]	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
[3]	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
[12]	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
[30]	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
[27]	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
[11]	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes
[29]	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes
[31]	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
[10]	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

4. Discussion

This study found a prevalence rate ranging from 4.3% to 62.4% among patients with co-occurring OCD and SUD in the general population. Similar findings are well documented in the literature, with several studies reporting a prevalence ranging from less than 10% to above 50% [1,3,36].

The wide range in prevalence observed in this study suggests that the co-occurrence of OCD and SUD varies across different populations or settings. This variability highlights the significance of understanding factors that influence the co-occurrence of these disorders. The co-existence of OCD and SUD can complicate clinical presentations, potentially leading to poorer treatment outcomes if not addressed concurrently. Recognizing the negative impact of the co-occurrence of these disorders, it is crucial to screen for both disorders to ensure early identification and treatment, thereby enhancing overall prognosis.

The variable prevalence of SUD in OCD patients may be due to a variety of factors. For example, individuals with OCD may use substances as a means of self-medication to alleviate the distress and anxiety caused by their obsessive–compulsive symptoms [37]. Alternatively, substance use may lead to the development of OCD symptoms, as some substances, such as amphetamines, cocaine, and alcohol, have been found to be associated with the onset of obsessive–compulsive symptoms [1]. There is a likelihood that the negative re-enforcement pattern seen in both OCD and SUD could be a contributory factor to the increased prevalence of SUD in patients with OCD and vice versa. Both disorders exhibit behaviours driven by a need to reduce anxiety and distress which can result in the use of substances as a coping mechanism for these feelings [7]. Researchers have identified several shared brain regions that are associated with both OCD and SUD [38]. These could suggest a potential linkage between these two disorders thereby playing a crucial role in the symptoms observed in both disorders. Potential mechanisms adduced for this linkage include factors such as impulsivity, negative re-enforcement pattern and sensation seeking, neurobiological pathways, genetic vulnerability, and shared risk factors, environmental influences [7,38–40]. Specifically, genetic and environmental factors, which include shared endophenotype and self-medication, respectively, may contribute to the co-occurrence of

OCD and SUD [38]. This review found that compulsivity is linked to the development of both SUD and OCD [3]. This compulsivity is mediated by the brain reward system, where dopamine, particularly D2 receptors in the striatum, plays a crucial role. Dysfunction in the neurotransmitter mechanism involving glutamate, serotonin and dopamine can contribute to the linkage between OCD and SUD which may play a role in the development of symptoms observed in both disorders. Research conducted on patients with OCD and SUD has reported abnormal levels of the neurotransmitter glutamate in the brain [39,40]. Glutamate is an excitatory neurotransmitter that plays a key role in various brain functions, including learning, memory, and synaptic plasticity [39–41]. When glutamate levels are too high or too low, it can lead to changes in brain function and behaviour [39–41]. Research findings indicate that individuals diagnosed with OCD demonstrate elevated levels of glutamate within specific regions of the brain such as the striatum and anterior cingulate cortex [39–41]. This may contribute to the repetitive behaviours and intrusive thoughts characteristic of the disorder. However, the exact relationship between glutamate and OCD symptoms is still under investigation. Similarly, in individuals with SUD, studies have shown that there are changes in the glutamate levels in the prefrontal cortex and other brain regions involved in reward processing and motivation [39,40]. This may contribute to the compulsive-seeking behaviour seen in addiction. Furthermore, changes in the prefrontal cortex, which is involved in decision making and reasoning, have also been reported in individuals with both OCD and SUD [39,40]. These changes may help explain the persistent and repetitive behaviour seen in these disorders despite negative outcomes.

Furthermore, patients diagnosed with both OCD and SUD have also exhibited abnormalities in serotonin levels indicating a dysfunction in this neurotransmitter [42]. These imbalances in serotonin neurotransmission have been shown to potentially contribute to the onset of obsessions and compulsions observed in OCD [43]. This could explain why selective serotonin reuptake inhibitors which increase serotonin levels are effective in the treatment of OCD. Similarly, in SUD, where serotonin dysregulation has been identified, altering serotonin levels can impact impulsivity and the regulation of emotions [43]. Dysfunction within the dopaminergic system in the cortico–striato–thalamo–cortical circuit has been observed in patients with OCD [13,14]. Despite shared biochemical characteristics of serotonin in both OCD and SUD, their pathophysiology and clinical symptoms varies with each disorder having different treatment [43]. The difference in their treatment suggests, although both disorders have an altered serotonin level, that their aetiologies are likely different. Further research to ascertain the link between the aetiologies and shared biochemical characteristics of OCD and SUD will contribute to early interventions and improved outcomes for both disorders. In the case of SUDs, substances of abuse can directly or indirectly increase dopamine levels, which leads to the reinforcing effects and development of addictive behaviour [42].

Studies in this review reported that OCD is more common in females when compared with males, with a female to male ratio ranging from 1.5:1 to 2:1 [3,11,12]. Similar finding has been reported in previous studies [27,44]. This disparity may be attributed to the overall higher rates of anxiety disorders in females compared to males [45]. In addition, this review also found that males were more likely to develop SUD than females [27,33]. The findings of Torres et al. [27] further emphasized that males with OCD exhibited a 3–4-fold greater likelihood of developing SUD compared to females. This observation has also been found in previous studies [46,47]. This gender difference may be related to biological, psychological, and social factors. Biologically, males may have a greater sensitivity to the rewarding effects of drugs compared with their female counterparts [48]. Additionally, from a psychosocial standpoint, males may be more likely to engage in risky behaviours that can lead to drug use disorders compared to females [3,49].

Furthermore, there was a greater likelihood of being diagnosed with SUD in individuals with OCD compared to the odds of SUD in individuals without a mental health disorder [3]. When comparing the co-occurrence of OCD and SUD, conclusion was drawn to be higher in males. Some studies have also reported a higher prevalence of co-occurring SUD and OCD in males compared to females irrespective of setting (clinic or general population), or substance used [2,3]. The finding that males with OCD are more likely to have co-occurring SUDs may have implication for treatment. The reasons for these may be related to their symptom presentation, access to treatment, or other factors. Overall, the gender differences in the prevalence of co-occurring OCD and SUDs highlights the importance of considering gender when evaluating and treating patients with this condition to promote more effective outcomes.

Jaisoorya et al. [32] found that participants in a community study with OCD tend to have a higher rate of SUD and AUD; however, among the clinical samples, the prevalence of AUD appears to be relatively lower.

Clinically, the co-occurrence of OCD and SUD may present a diagnostic challenge due to various factors. Firstly, the symptoms of OCD often overlap with those of SUD, which becomes evident when individuals with SUD exhibit repetitive behaviours associated with drug seeking [42]. Another reason for this difficulty lies in the masking effect that occurs, making it challenging to identify the underlying disorder. Additionally, the presence of other co-existing conditions such as anxiety and depression in individuals with OCD and SUD can further complicate the diagnostic process [50]. Lastly, individuals suffering from both OCD and SUD may be reluctant to disclose their symptoms, which adds another layer of complexity to the diagnostic process [51]. Given the increased prevalence of co-occurring SUD and OCD in the general population, it is imperative to provide effective treatment options for patients who experience co-occurrence of SUDs and OCD. Their treatment can be complex and often necessitates an integrated approach that tackles both conditions simultaneously to achieve good clinical outcomes for the affected individuals.

A comprehensive approach to treatment often involves combining various evidence-based therapies. These may include cognitive–behavioural therapy (CBT), exposure and response prevention (ERP), motivational interviewing, and pharmacotherapy. CBT is a widely recognized and effective treatment for both OCD and SUD [52,53]. CBT emphasizes identifying and changing unhealthy thoughts, beliefs, behaviours, substance use triggers and maladaptive coping skills. Exposure and response prevention therapy (ERP) is a specific form of CBT that targets obsessive thoughts and compulsive behaviours [53–55]. In addition to CBT and ERP, there are other psycho-social therapies available for treating OCD and SUD. These may include Motivational Enhancement Therapy, Supportive Therapy, participation in support groups, and making life style changes [55]. Pharmacological interventions such as selective serotonin reuptake inhibitors (SSRI) have also been trialled and proven effective in the treatment of both OCS and SUD [55]. In addition, specialised treatment programs such as dual diagnosis treatment programs address the individualised needs of patients with co-occurring OCD and SUDs. By adopting an integrated treatment approach that addresses both OCD and SUD simultaneously, patients can effectively manage both conditions. These approaches not only assist in symptom reduction but also provides a deeper understanding of the complex interactions between these two disorders.

Some challenges have been identified in the treatment engagement and retention in patients with comorbid OCD and SUDs in both the general population and clinical settings. Patients with comorbid OCD and SUD often have feelings of shame and stigma, which may result in hesitation to seek help or engage with treatment [51]. Sometimes, one diagnosis may overshadow the other, leading to underdiagnosis or misdiagnosis [42]. In addition, prioritizing which symptoms of the disorders to treat at the onset of treatment may also

be challenging. Moreover, there is limited access to suitable resources, individualised specialized programs, and professionals who possess expertise in treating both disorder [51]. The scarcity of resources and expertise amplifies the risk of relapse among individuals grappling with both OCD and SUD. The intricate interplay between obsessive–compulsive behaviours and substance use adds to the complexity of challenges faced by these individuals. Recognising these challenges is essential for the development of more effective interventions and support systems tailored to those with both OCD and SUD.

5. Limitations

The papers displayed heterogeneity, presenting challenges in conducting a meta-analysis. This complexity stemmed from the diverse definitions of the term SUDs across various papers, creating difficulty in establishing an accurate assessment of absolute prevalence. Another limitation of this study is its cross-sectional design. which limits the ability to infer a causal relationship between OCD and SUD; however, it effectively highlighted the prevalence of comorbid OCD and SUD.

6. Conclusions

In conclusion, our study on the prevalence of SUD in individuals with OCD reveals a variability in the co-occurrence of these conditions. Our findings underscore the importance of recognising that the association between OCD and SUDs varies depending on the type of substance involved.

The overall prevalence rate of co-occurring OCD and SUDs emphasises the imperative for additional research to deepen our understanding of the intricate relationship between these disorders. This, in turn, will aid in the development of comprehensive treatment strategies that concurrently address both OCD and SUDs, thereby optimising therapeutic outcomes for affected individuals.

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