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Meta-Analysis: Hoarding Symptoms Associated with Poor Treatment Outcome in Obsessive-Compulsive Disorder

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Abstract

DSM-5 recognizes Hoarding Disorder as distinct from Obsessive-Compulsive Disorder (OCD), codifying a new consensus. Hoarding Disorder was previously classified as a symptom of OCD and patients received treatments designed for OCD. We conducted a meta-analysis to determine whether OCD patients with hoarding symptoms responded differently to traditional OCD treatments than OCD patients without hoarding symptoms. An electronic search was conducted for eligible studies in PubMed. A trial was eligible for inclusion if it was (1) a randomized controlled trial, cohort or case-control study; (2) compared treatment response between OCD patients with and without hoarding symptoms, or examined response to treatment between OCD symptom dimensions (which typically include hoarding) and (3) examined treatment response to pharmacotherapy, behavioral therapy, or their combination. Our primary outcome was differential treatment response between OCD patients with and without hoarding, expressed as an odds ratio. Twenty-one studies involving 3039 total participants including 304 with hoarding symptoms were included. Patients with OCD and hoarding symptoms were significantly less likely to respond to traditional OCD treatments than OCD patients without hoarding symptoms (OR=0.50 (95%CI:

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0.42–0.60), $z=-7.5$, $p<0.0001$). This finding was consistent across treatment modalities. OCD patients with hoarding symptoms represent a population in need of further treatment research. OCD patients with hoarding symptoms may benefit more from interventions specifically targeting their hoarding symptoms.

Keywords

obsessive-compulsive disorder; hoarding; meta-analysis; behavioral therapy; pharmacotherapy

Introduction

DSM-5 recognizes Hoarding Disorder as distinct from Obsessive-Compulsive Disorder.¹ Hoarding disorder is characterized by (1) Persistent difficulty discarding or parting with possessions, regardless of their actual value; (2) a perceived need to save items and distress associated with discarding them, that results in (3) the accumulation of possessions that clutter living areas and compromises their intended use.¹ Patients with hoarding symptoms have been known to build up so much clutter that they cannot complete daily activities such as cooking, cleaning, or moving around their house. Hoarding disorder is estimated to affect 1.5% of the population and, left untreated, can cause occupational problems and have a significant public health impact.²

Until DSM-5, hoarding symptoms were often classified as an aspect of OCD.³ The expressed cognitions of many individuals who hoard can be understood in this light – obsessions characterized by a fear of losing things and compulsions to acquire and save objects. However, a number of factors suggest that hoarding may be a unique variation or even a disorder entirely discrete from OCD, despite frequent comorbidity. More than 80% of individuals with hoarding symptoms do not show any of the core symptoms of OCD.^{4–6} Hoarding symptoms are more often comorbid with major depression, social phobia, and generalized anxiety disorder than with OCD.⁵ While OCD patients typically have some insight into their condition, patients with hoarding symptoms frequently do not and find built up clutter, rather than the underlying behaviors that lead to it, to be more of an issue.⁷ Unlike obsessions, hoarding thoughts are not generally experienced as unsettling or intrusive; instead they feel like a normal stream of thought.⁸ A series of factor and cluster analytic studies in OCD patients have consistently identified hoarding symptoms as a distinct entity.⁹ Experts have suggested the two disorders are neurobiologically distinct, with patients with hoarding symptoms displaying a unique pattern of resting brain function and different symptom-regulating neural circuits than OCD patients.^{10–13} Furthermore, there are preliminary findings which suggest OCD and hoarding may have different genetic origins.^{14, 15, 16}

Because of hoarding's previous classification in DSM-IV with OCD, patients with prominent hoarding symptoms have, until recently, typically been presented with similar treatment options to OCD patients, and the majority of the treatment research on patients with hoarding symptoms has occurred in patients in OCD trials rather than specifically in identified hoarding populations. These treatment options include selective serotonin

reuptake inhibitors (SSRIs) and cognitive behavioral therapy (CBT).¹⁷ Few treatment studies have been conducted specifically in patients with hoarding symptoms.^{18, 19} Patients with hoarding symptoms have been reported to have poor treatment response compared to other OCD patients in some studies, though not all (see below). The purpose of our meta-analysis was to determine whether OCD patients with hoarding symptoms have a worse response to traditional OCD treatments than OCD patients without hoarding symptoms. We also sought to determine the magnitude of the difference in treatment response and whether it is specific to the type of intervention (CBT or pharmacotherapy).

METHODS

Search strategy

An electronic search was performed using PubMed with the search terms “Obsessive-Compulsive Disorder”[Mesh] AND (factor-analytic[All Fields] OR factors[All Fields] OR “obsessive hoarding”[MeSH Terms] OR (“obsessive”[All Fields] and “hoarding”[All Fields]) OR “obsessive hoarding”[All Fields] OR “hoarding”[All Fields]) AND (“Drug Therapy”[Mesh] OR “treatment outcome”[Mesh] OR “Psychotherapy”[Mesh]) on April 22, 2013. Each result returned by the search was examined to determine if it met our inclusion criteria. Selected articles were also searched for relevant citations, which were then subjected to the same eligibility analysis.

Inclusion criteria

A trial was eligible for inclusion in our meta-analysis if it was (1) a randomized controlled trial, cohort or case-control study; (2) compared treatment response between OCD patients with and without hoarding symptoms and OCD, or examined response to treatment between OCD symptom dimensions (which typically include hoarding)²⁰ and (3) examined treatment response to pharmacotherapy, behavioral therapy, their combination or placebo. Trials were excluded if they did not study OCD patients with and without hoarding symptoms or if they did not examine response to pharmacotherapy, behavioral therapy, or placebo. We found only one study that compared placebo response in patients with hoarding symptoms to patients without hoarding symptoms, so we excluded this as an outcome.²¹

Meta-analytic procedure

Data from the included articles were organized into an ExcelTM spreadsheet. We extracted age (child or adult sample), treatment type (pharmacotherapy, behavioral therapy, or placebo), response criteria utilized in studies, and the number of OCD patients with hoarding symptoms and OCD patients without hoarding symptoms included in the trial. From each study, the proportion of treatment responders in OCD patients with hoarding symptoms and OCD patients without hoarding symptoms was recorded. OCD patients were defined as having hoarding symptoms based on the criteria defined in the primary studies. When the proportion of treatment responders was not available in mean and standard deviation of Yale-Brown Obsessive-Compulsive Scale (Y-BOCS),^{22, 23} improvement was recorded for each group. If neither of the first two outcomes were available then mean and standard deviation of the Dimensional Yale-Brown Obsessive-Compulsive Scale (DY-BOCS) hoarding and other subscales were recorded.²⁴

Our primary outcome measure was odds ratio of treatment response in OCD patients with and without hoarding symptoms. All statistical analyses were performed using Comprehensive Meta-Analysis version 2 (CMA; Biostat, Englewood, NJ). Effect sizes of trials whose outcomes were reported as a continuous measure were converted to odds ratio as a summary measure in CMA. Standardized Mean Difference is converted to odds ratio in CMA using the formula $\ln(OR) = \pi * SMD / 3$. A fixed (as opposed to random) effects model was used for the meta-analysis because there was a strong possibility of publication bias in the results, which is more likely to be published or reported in sufficient detail for meta-analysis if the results are positive. Fixed effects models give less weight to small studies compared to random-effects models and thus are considered more appropriate in situations where there are concerns of publication bias. We report the results of a random-effects model as an additional sensitivity analysis. We conducted an additional sensitivity analysis excluding studies in which the odds ratio was estimated from continuous rating scales.

Heterogeneity between studies was determined by means of two separate statistical estimates using Comprehensive Meta-Analysis. First, a *Q*-statistic was employed to provide a test of statistical significance indicating whether the differences in effect sizes are due to subject-level sampling error alone or other sources. In addition, we estimated heterogeneity using *I-squared* statistic, which estimates the proportion of total variance that can be attributed to between-study variance. Publication bias was assessed by plotting the effect size against standard error for each trial (funnel plot).²⁵ In addition, publication bias was statistically tested by the Egger's test.²⁵

We conducted a stratified subgroup analyses to examine the effects of (1) type of intervention utilized – (pharmacotherapy, behavioral therapy or combination treatment), (2) age (child vs. adult sample) and (3) method for assessing treatment response. For method for assessing treatment response we stratified studies based on whether they classified treatment response as a dichotomous outcome by (1) reduction in Y-BOCS, (2) CGI or (3) combination of both CGI and Y-BOCS criteria or by examining symptom reduction as a continuous measures using the (4) Y-BOCS or (5) DY-BOCS. For stratified subgroup analyses, we examined whether stratification significantly reduced heterogeneity as measured by the *Q*-statistic.

RESULTS

Included Studies

Twenty-one studies with a total of 3039 participants were included in this meta-analysis.^{21, 26–45} Figure 1 shows the selection of these studies from the 414 results returned by our PubMed search and identified from relevant reviews. Seven of these studies (involving 8 comparison arms) examined the efficacy of behavioral therapy, seven of pharmacotherapy, and seven of combination treatment with pharmacotherapy and behavioral therapy. The characteristics of the 21 studies are depicted in Table 1.

Treatment Response in OCD Patients with and without hoarding symptoms

Figure 2 depicts a forest plot comparing treatment response in OCD patients with and without hoarding symptoms. OCD patients with hoarding symptoms had a significantly worse treatment response than OCD patients without hoarding symptoms (OR=0.50 (95% CI: 0.42–0.60), $z=-7.5$, $p<0.0001$, $k=22$). There was moderate heterogeneity in treatment-response between studies ($Q=27.2$, $df=21$, $p=0.17$, $I^2=22.7\%$). Results were similar when a random-effects model was utilized instead of a fixed effects model for meta-analysis (OR=0.50 (95% CI: 0.40–0.62), $z=-6.3$, $p<0.0001$, $k=22$) and when studies where odds ratio had to be extrapolated from other effect size data were excluded (OR=0.51 (95% CI: 0.36–0.72), $z=-3.8$, $p<0.0001$, $k=14$). There was no evidence of publication bias from inspection of the funnel plot or using the Egger's test (intercept=-0.5 (95% CI: -1.9–0.9), $t=0.8$, $p=0.46$).

Effect of Type of Intervention on Response to Treatment in OCD patients with and without Hoarding

Type of intervention did not significantly reduce heterogeneity (Test for Subgroup differences: $Q=1.6$, $df=2$, $p=0.44$). OCD patients with hoarding symptoms experienced significantly worse treatment outcome across treatment type: behavioral therapy (OR=0.60 (95% CI: 0.43–0.82), $z=-3.2$, $p=0.001$, $k=8$, $Q=5.5$, $df=7$, $p=0.60$, $I^2=0\%$), pharmacotherapy (OR=0.46 (95% CI: 0.34–0.62), $z=-5.2$, $p<0.001$, $k=7$, $Q=4.3$, $df=6$, $p=0.64$, $I^2=0\%$) and combination (OR=0.47 (95% CI: 0.34–0.65), $z=-4.6$, $p=0.001$, $k=7$, $Q=15.7$, $df=6$, $p=0.02$, $I^2=61.9\%$). Figure 2 depicts the treatment response of OCD patients with hoarding symptoms compared to OCD patients without hoarding symptoms when stratified by type of intervention received.

Effect of Response Criteria and Rating Scale on Response to Treatment in OCD patients with and without hoarding symptoms

Stratified subgroup analysis suggested that the specific rating scales utilized by trials and the study defined outcome did not significantly affect the relative response of OCD patients with hoarding symptoms to traditional OCD treatments ($Q=6.4$, $df=4$, $p=0.17$). Studies that defined treatment response by the Y-BOCS (OR=0.39 (95% CI: 0.25–0.62), $z=-4.0$, $p<0.001$, $k=5$) or examined change in Y-BOCS scores by symptom dimension (OR=0.44 (95% CI: 0.35–0.57), $z=-6.3$, $p<0.001$, $k=6$) reported a nominally worse treatment response in hoarders compared to other methods, but not to a statistically significant degree. Studies that utilized the CGI to determine response (OR=0.56 (95% CI: 0.32–0.99), $z=-2.0$, $p=0.045$, $k=5$) also reported significantly poorer response of OCD patients with hoarding symptoms compared to OCD patients without hoarding symptoms. Studies that defined treatment response using both the CGI and Y-BOCS (OR=0.81 (95% CI: 0.46–1.40), $z=-0.8$, $p=0.44$, $k=3$) or reported change in DY-BOCS ratings by symptom dimension (OR=0.66 (95% CI: 0.41–1.06), $z=-1.7$, $p=0.08$, $k=3$) reported a worse response in OCD patients with hoarding symptoms compared to OCD patients without hoarding symptoms but not to a statistically significant degree.

Treatment Response in Adults and Children with OCD with and without Hoarding Symptoms

Poorer treatment response in OCD patients with hoarding symptoms was seen both in adults (OR=0.50 (95% CI: 0.41–0.60), $z=-7.3$, $p<0.001$, $k=18$) and in children (OR=0.57 (95% CI: 0.34–0.97), $z=-2.1$, $p=0.04$, $k=4$), with no significant difference between the two ($Q=0.2$, $df=1$, $p=0.63$). When studies involving children were eliminated from the analysis, there was no significant difference among treatment modalities ($Q=2.3$, $df=2$, $p=0.31$, $I^2=12\%$). Adult OCD patients with hoarding symptoms experienced significantly worse outcomes than those without hoarding symptoms in response to behavioral therapy (OR=0.61 (95% CI: 0.43–0.87), $z=-2.7$, $p=0.007$, $k=6$, $Q=5.4$, $df=5$, $p=0.37$, $I^2=7\%$), combination treatment (OR=0.42 (95% CI: 0.30–0.58), $z=-5.1$, $p<0.001$, $k=6$, $Q=10.2$, $df=5$, $p=0.7$, $I^2=51\%$) and pharmacotherapy (OR=0.49 (95% CI: 0.36–0.66), $z=-4.7$, $p<0.001$, $k=6$, $Q=1.4$, $df=5$, $p=0.92$, $I^2=0\%$).

Discussion

Our meta-analysis showed a strong association between hoarding symptoms and poor response to traditional OCD treatment. OCD patients with hoarding symptoms were roughly 50% (range 40–58%) less likely to respond to traditional OCD treatments compared to OCD patients without hoarding symptoms. These findings reinforce the widespread clinical perception that the presence of hoarding symptoms is often a predictor of poor response to either cognitive behavioral or pharmacological interventions for OCD. Our results extend this perception by demonstrating that hoarding symptoms were associated to a comparable degree with poor treatment response regardless of treatment modality.

The poor response to treatment (regardless of modality) observed in OCD patients with hoarding symptoms could be attributable to a variety of factors. Hoarding symptoms in OCD have been previously associated with poor insight and increased comorbidity with MDD, social phobia, PTSD and impulse-control disorders.^{5, 46–48} These factors may contribute to decreased treatment compliance in OCD patients with hoarding symptoms. In fact, hoarding symptoms in OCD patients have been associated with poor compliance with behavioral treatments.⁴² Hoarding symptoms may also have a different underlying etiology that may be less responsive to treatment than other OCD symptoms.

The differing treatment response between OCD patients with and without hoarding symptoms highlights an emerging distinction between hoarding symptoms and OCD. As previously stated, there are many factors which suggest hoarding is not just a subtype of OCD. The majority of patients with prominent hoarding symptoms do not have significant OCD symptoms. In addition, neuroimaging studies have suggested differing neurocircuitry in patients with prominent hoarding symptoms compared to non-hoarding OCD patients.^{10–13} Likewise, genetic studies have demonstrated genes associated with hoarding but not non-hoarding OCD.⁴⁹ We demonstrate clearly reduced treatment response of OCD patients with hoarding symptoms to current first-line interventions for OCD.

Our meta-analysis had several limitations. We only searched PubMed dataset which may have missed unpublished or non-English language studies. We also had a fairly small

number of studies, especially when stratifying for different treatment modalities and the age of the participants. Therefore we could only examine a subset of potentially important moderators. Additional moderators that would have been worth examining if more studies were available include: duration of treatment, doses of medication, severity of symptoms, facets of behavioral therapies, previous treatment history, and presence of other OCD symptoms in hoarding subjects. The fairly small number of studies also gave us limited power to detect moderating effects of the variables we could examine. There was a moderate amount of heterogeneity between study results. This heterogeneity may be attributable to different definitions of treatment response and different criteria for having hoarding symptoms between included studies. Other possible sources of heterogeneity that could not be explored in this meta-analysis are the impact of symptom severity, comorbid conditions and duration or quality of treatment. Additionally, included studies involved OCD patients with primary hoarding symptoms and did not include hoarding patients without OCD symptoms in study samples. This may limit the generalizability of the results of the current meta-analysis to patients diagnosed with hoarding disorder by DSM-5 criteria.⁵⁰ However, to our knowledge only one study compared pharmacological response in patients with hoarding symptoms (without OCD symptoms) to OCD patients. This study demonstrated a non-significantly worse treatment response in patients with hoarding symptoms that was fairly consistent with the results of the meta-analysis. Another limitation of this meta-analysis is the use of the Y-BOCS scale as an outcome measure for most of these trials. The Y-BOCS scale is the gold-standard for measurement of OCD symptoms and was not primarily designed to assess hoarding symptoms. It remains possible that some of the poor response seen in patients with hoarding symptoms, as opposed to other OCD patients, is resulting from a relative lack of sensitivity of the Y-BOCS to changes in hoarding symptoms. Evidence in favor of this interpretation from the meta-analysis is that studies that used the Y-BOCS either as the sole criteria for response or to measure change in symptoms reported a worse response of OCD patients with hoarding symptoms compared to OCD patients without hoarding symptoms. Evidence against this interpretation from the meta-analysis was that (1) this analysis of reported effects of hoarding treatment outcomes difference stratified by response criteria did not even reach trend levels of significance and (2) even meta-analysis of studies that used response criteria other than the Y-BOCS (e.g. the DY-BOCS or CGI) demonstrated poor response of OCD patients with hoarding symptoms compared to OCD patients without hoarding symptoms. Because of these issues in previous studies, it remains critical that further treatment research examine the efficacy of traditional pharmacological interventions for OCD in Hoarding Disorder using appropriate and validated measures for the condition.⁵¹

The findings of our meta-analysis have important treatment and research implications for individuals with hoarding symptoms. Treatment research in hoarding should focus on whether existing treatments for OCD are effective in Hoarding Disorder at all.^{52, 53} The reduced response of OCD patients with hoarding symptoms to traditional OCD treatments suggests only that these treatments are less effective in this population, not necessarily that they are not effective at all. SSRIs, the first-line pharmacological treatment for OCD, are still recommended as first-line pharmacotherapy in patients with hoarding even though they have never been studied in a randomized, placebo-controlled trial in patients with Hoarding

Disorder.⁵³ For treatments such as cognitive-behavioral therapy, research should focus on how they can be modified to improve outcomes.^{19, 54} Most of the trials in this meta-analysis included CBT interventions that were designed for OCD patients rather than Hoarding Disorder. Although initial studies of CBT interventions specifically designed for individuals for Hoarding Disorder are promising, additional research is needed to confirm and refine these targeted interventions.^{18, 19} It is also unclear how much of the differences in rates of treatment-response between OCD patients with and without hoarding symptoms is due to a relative insensitivity in the Y-BOCS to changes in hoarding symptoms. Results from stratified subgroup analysis in this meta-analysis suggests that issues with rating scales does not explain much of the poor treatment response observed in OCD patients with hoarding symptoms. In assessing symptom improvement in hoarding subjects, using rating scales specific to hoarding symptoms will likely be more sensitive to these changes.^{51, 55, 56}

Our meta-analysis suggests that OCD patients with hoarding symptoms have a poorer response to evidence-based, traditional OCD treatments. DSM-5 has now formalized the distinction between hoarding and OCD that has emerged in the clinical, neuroimaging and genetic research. Hopefully, the new recognition of Hoarding Disorder will lead to improved treatment of individuals who suffer from this condition.

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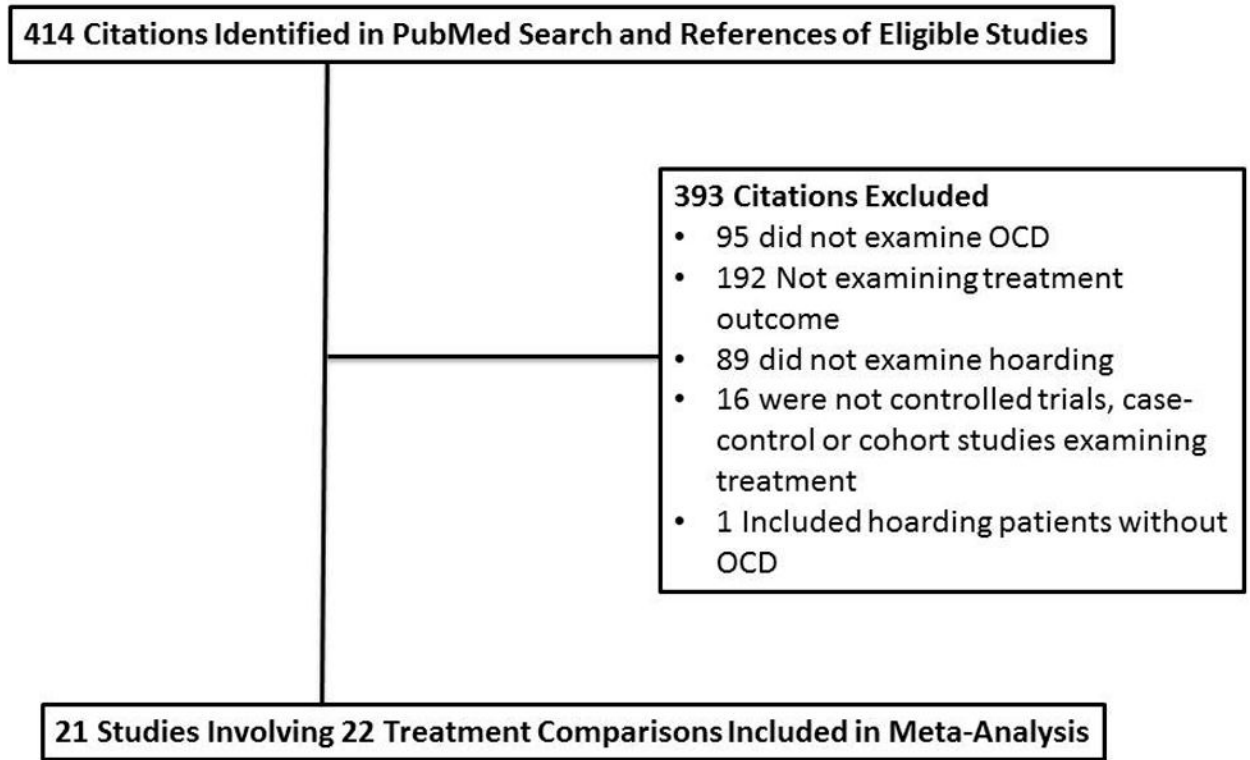


Figure 1.
Selection of Studies

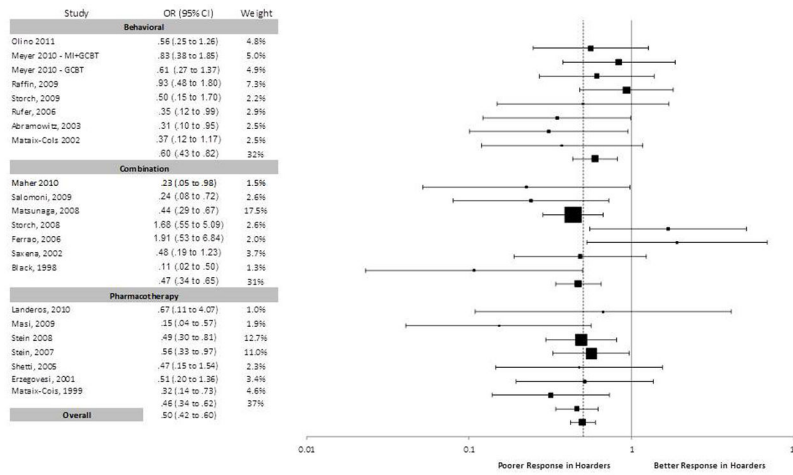


Figure 2. Treatment Response in OCD patients with hoarding symptoms compared to OCD patients without hoarding symptoms

Forest Plot examining likelihood of treatment response in OCD patients with hoarding symptoms compared to OCD patients without hoarding symptoms. OCD patients with hoarding symptoms had a significantly poorer treatment response overall and across treatment modalities. There was evidence of significant heterogeneity between trials.

TABLE 1

Characteristics of Included Studies

Author	Year	OCD patients with hoarding symptoms	OCD patients without hoarding symptoms	Age Group	Design	Intervention	Response Criteria
Mataix-Cols et al. ⁴²	2002	20	55	adults	RCT	Behavioral Therapy	YBOCS reduction 40%
Abramowitz et al. ⁴⁵	2003	16	116	adults	cohort	Behavioral Therapy	Reduction in Y-BOCS score
Rufer et al. ³⁸	2006	19	75	adults	cohort	Behavioral Therapy	YBOCS reduction 35%
Storch et al. ³⁴	2008	14	78	children	case-control	Behavioral Therapy	CGI 2
Raffin et al. ³⁹	2009	88	93	adults	case-control	Behavioral Therapy [#]	YBOCS reduction 35% and CGI 2
Meyer et al. ⁴¹	2010		39	adults	cohort	Behavioral Therapy [#]	Change in dimensional DY-BOCS scores [*]
Olino et al. ⁴⁰	2011		41	children	cohort	Behavioral Therapy	Change in dimensional DY-BOCS scores [*]
Black et al. ⁴⁴	1998	17	21	adults	case-control	Combination	YBOCS reduction 40% and CGI 2
Saxena et al. ³⁶	2002	20	170	adults	cohort	Combination	YBOCS reduction 35%
Ferrao et al. ²⁷	2006	14	35	adults	case-control	Combination	YBOCS reduction 25% and CGI 3
Storch et al. ³⁴	2008	20	40	children	case-control	Combination	CGI 2
Matsumaga et al. ³⁰	2008		295	adults	cohort	Combination	Percent change in Y-BOCS score [*]
Salomoni et al. ³⁷	2009	18	112	adults	case-control	Combination	YBOCS reduction 40%
Maher et al. ⁴³	2010	7	47	adults	RCT	Combination	Change in Y-BOCS score [*]
Mataix-Cols et al. ²¹	1999		150	adults	6 RCTs	Pharmacotherapy	Change in Y-BOCS score [*]
Erzegovesi et al. ³¹	2001	19	140	adults	case-control	Pharmacotherapy	YBOCS reduction 35%
Shetti et al. ³⁵	2005	13	109	adults	case-control	Pharmacotherapy	CGI 2
Stein et al. ²⁹	2007		385	adults	RCT	Pharmacotherapy	Change in Y-BOCS score [*]
Stein et al. ²⁸	2008		344	adults	RCT	Pharmacotherapy	Change in Y-BOCS score [*]
Masi et al. ²⁶	2009	14	206	children	case-control	Pharmacotherapy	CGI 2 and CGI 3 for 3 consecutive months
Landeros et al. ³²	2010	5	212	adults	4 RCTs	Pharmacotherapy	CGI 2

Abbreviations: YBOCS=Yale-Brown Obsessive-Compulsive Scale, CGI=Clinical Global Improvement, DY-BOCS=Dimensional Yale-Brown Obsessive-Compulsive Scale.

[#] Studies utilizing group rather than individual behavioral therapy.

^{*} Studies defined treatment outcome on a continuous scale.

Effect size was converted to odds ratio using Comprehensive Meta-Analysis. Sensitivity analysis yielded similar results when these studies were included or excluded.

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