Prevalence of Attention Deficit Hyperactivity Disorder among Distinct Symptom Dimensions in Adult Patients with Obsessive-Compulsive Disorder

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Abstract:
Prevalence of attention deficit hyperactivity disorder among distinct symptom dimensions in adult patients with obsessive-compulsive disorder

Objective: Obsessive-compulsive disorder (OCD) is known to frequently coexist with attention deficit hyperactivity disorder (ADHD). However, the two disorders are characterized by a variety of opposite clinical and biological features. We investigated whether different symptom dimensions of OCD might account for this intriguing comorbidity given the different phenomenological and neurobiological characteristics exhibited by patients with OCD.

Methods: The sample of this study comprised one hundred and ninety-six patients with OCD who were classified according to their principal obsession or compulsion: (1) contamination and washing; (2) taboo thoughts (sexual, aggressive, or religious obsessions); and 3) symmetry, counting, repeating, or ordering (SCRO). Our study examined whether or not ADHD accompanies any of the abovementioned symptom dimensions. The prevalence of ADHD was assessed by using the DSM-IV criteria. The prevalence of tic disorders, smoking, and alcohol or substance use disorder (SUD) was also examined. The Yale-Brown Obsessive Compulsive Scale (Y-BOCS), 17-Item Hamilton Depression Rating Scale (HDRS-17), Beck Anxiety Inventory (BAI), and Barratt Impulsiveness Scale Version 11 (BIS-11) were administered.

Results: The prevalence of ADHD in the following symptom dimensions was 11.6% (n=8) for washing, 20.4% (n=22) for taboo thoughts, and 26.3% (n=5) for SCRO. These differences, however, were not found to be significant. Additionally, neither the total BIS-11 scores nor its subscale scores concerning cognitive impulsiveness, motor impulsiveness, and non-planning differed significantly among the three symptom dimensions. Further, the scores of HDRS-17 and BAI and the prevalence of tic disorder, alcohol abuse, and SUDs were not significantly different among the symptom dimensions. On the other hand, the Y-BOCS scores including the scores of its subscales of obsession and compulsion were significantly higher in the washing symptoms group than the other two groups (p<0.0001), and the prevalence of smoking differed significantly among the three dimensions (p<0.004): 23.2% of the individuals with washing symptoms, 29.6% of the individuals with taboo thoughts, and 63.2% of those with SCRO symptoms were smokers.

Conclusions: The prevalence of ADHD was approximately twice as high in individuals with taboo thoughts and about two and half times as high in individuals with SCRO symptoms compared to individuals with washing symptoms. However, this obvious difference did not reach significance, possibly because of the small sample size. Significant differences in the prevalence of smoking exhibited the same pattern of distribution as the prevalence of ADHD among the symptom dimensions, suggesting that the relationship between OCD symptom dimensions and various aspects of ADHD requires further investigation. In addition, similar levels of impulsiveness were observed among the three symptom dimensions, contributing to the peculiarities in the co-occurrence of OCD, ADHD, and addiction. Further research involving more participants should shed further light on ADHD as a comorbidity with the different symptom dimensions of OCD.

Keywords: Obsessive-compulsive disorder, symptom dimensions of obsessive-compulsive disorder, contamination and washing, taboo thoughts, aggressive obsessions, religious obsessions, blasphemous obsessions, symmetry/counting/repeating/ordering, attention deficit hyperactivity disorder, psychiatric comorbidity

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INTRODUCTION

Obsessive-compulsive disorder (OCD) is a heterogeneous disorder characterized by distinct symptoms such as contamination/washing, aggression/checking, religious, sexual, and symmetry/ordering obsessions, counting, and repeating. Factor analysis studies have identified these symptom clusters to be OCD subtypes. Research over a span of nearly two decades has suggested four different symptom patterns: (1) contamination/washing; (2) forbidden or taboo thoughts (including aggressive, religious, and sexual); (3) symmetry, counting, repeating, and ordering (SCRO); (4) and hoarding (1).

Each dimension is different from the other in its symptom structure and features of clinical phenomenology, course and outcome, family history, and neurobiology. Taboo thoughts manifest as waxing and waning more frequently than the symptom of symmetry (2). Further, taboo thoughts are accompanied by anxiety disorders and depression, while the symptom of washing is accompanied by eating disorders, and SCRO by bipolar and panic disorders (3,4). The age of onset is earlier in the development of taboo thoughts and symmetry obsession, whereas in those with washing symptoms, OCD is more severe, functioning more impaired, and insight poorer than in the other symptom dimensions (4). Washers are also more likely to be women and it is common for there to be a history of OCD among their family members (4). Neuroimaging studies have showed that somewhat different brain areas are involved in the different symptom dimensions (5). The hoarding dimension was eventually classified as a separate disorder from OCD in the DSM-5 scale (6) as it stood apart due to its distinctive properties when compared to other dimensions.

An interesting clinical fact is the frequent comorbidity of OCD and ADHD, despite the incongruity in their core features—for example, increased sense of danger and harm-avoidance experienced by OCD patients in contrast to seeking pleasure, high-risk taking, and impulsiveness of ADHD patients. The prevalence of ADHD in patients with OCD has been found to be up to 60% in children and adolescents and up to 23% among adults (7). Neuroimaging studies have added further complexity to the mystery of the high rate of comorbidity by showing that neurobiological features of these two disorders contrast acutely (7). Prefrontal and striatal areas involved in both disorders are characterized by hyper-metabolism and increased connectivity in OCD patients but decreased metabolism in ADHD patients (7).

Few studies have investigated the coexistence of OCD and ADHD according to symptom dimensions. It is not surprising that the presence of ADHD may vary among symptom dimensions given the heterogeneity of OCD. The first aim of our study was to investigate the prevalence of ADHD in adult patients with OCD, according to the distinct symptom dimensions. Second, we compared the levels of impulsiveness, a basic characteristic of ADHD, and the frequencies of nicotine, alcohol, and substance use, which are high in ADHD patients (8).

METHODS

Our sample comprised 196 adults between 18 and 72 years with a mean age of 31.7±10.3, who were outpatients (93 females, 47.4%, 103 males 52.6%) at the Üsküdar University Health Practice and Research Center Feneryolu Outpatient Department between January 2013 and December 2015. Patients with schizophrenia and other psychotic disorders, bipolar disorders, mental retardation, previous head injuries, and neurological disorders such as epilepsy and multiple sclerosis were excluded. The percentage of individuals using psychotropic medication during the assessments was 69.9% (n= 137). The DSM-IV criteria (9) were used to diagnose all psychiatric disorders including ADHD, using the Structured Clinical Interview for Axis I Disorders (SCID-I) (10). The University’s ethic committee approved the design. Informed written consents were obtained from the respondents of this study.

In accordance with a meta-analysis (1) of 21 factor analyses involving 5124 participants, we subdivided the symptoms of OCD into the following three dimensions: (1) contamination and washing; (2) taboo thoughts (sexual, aggressive, and religious obsessions); (3) symmetry, counting, repeating, and ordering (SCRO). The Yale-Brown Obsessive Scale (Y-BCOS) was used to classify a patient’s dimension through the scale’s symptom checklist by marking the principal symptom (the predominant and most distressing symptom type prevailing in the clinical picture during the assessment) of the patient (11). Individuals who complained primarily about obsessions or compulsions that do not fit any of the three dimensions were not included (nine patients). Moreover, the patients in whom two or more
symptom dimensions were identified as equally severe were excluded (14 patients). We did not include hoarding, as the sample for this symptom dimension was too small to allow statistical analysis (two patients). They were usually inpatients and our research was designed for outpatients. In addition, the DSM-5 classified hoarding as a separate disorder from OCD. Therefore, we excluded 25 individuals and included 196 people from a total of 221 patients.

The Y-BOCS (11,12), the Hamilton Depression Rating Scale-17 Items (HDRS-17) (13,14), the Beck Anxiety Inventory (BAI) (15,16) were used to measure the severities of OCD, depressive symptoms, and anxiety respectively. The Barratt Impulsiveness Scale-11 (BIS-11) was employed to assess the levels of impulsiveness in three aspects: cognitive impulsiveness (CI), motor impulsiveness (MI), and non-planning (NP) (17,18).

The analyses were performed using the SPSS software (Statistical Package for the Social Sciences, version 21.0; SPSS Inc., Chicago, IL, USA). Continuous variables were expressed as mean ± S.D. and categorical variables as percentages. Analysis of normality was performed with the Kolmogorov–Smirnov test. Differences in parametric continuous variables for more than two groups were analyzed by ANOVA, and the Tukey HSD analysis was used for binary comparisons. Differences in non-parametric continuous variables for more than two groups were analyzed by the Kruskal-Wallis test. Differences in the ratio of two categorical variables were analyzed by Fischer’s exact test (for 2 × 2 crosstable) and chi-Square test (for n × n crosstable). Statistical significance was tested for level of alpha = 0.05.

RESULTS

The findings are shown in Table 1. Ages during the assessment and at the onset of OCD were similar in all symptom dimensions. The difference in gender distribution was significant (p<0.0001): 71% of the washing symptom group was female, while 67.6% in the taboo thoughts symptom group was male. In the SCRO group, no significant difference was observed in gender distribution.

The Y-BOCS and its subscale scores concerning obsession and compulsion were significantly different among the groups (p<0.0001). The Y-BOCS scores were the highest in those with washing symptoms, but similar between the other two groups. The obsession scores were similar between washers and individuals with taboo thoughts, but these were higher than the scores in individuals with SCRO symptoms. Participants with washing and SCRO symptoms had similar compulsion scores, which were

<table>
<thead>
<tr>
<th>Table 1: Comparison of symptom dimensions</th>
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<tr>
<td>Whole group (n= 196)</td>
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<tr>
<td>Gender (n, %)</td>
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<tr>
<td>Female</td>
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<tr>
<td>Male</td>
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<tr>
<td>Age 31.7±10.3</td>
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<tr>
<td>Age of onset 20.6±8.8</td>
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<tr>
<td>Y-BOCS 22.5±7.2</td>
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<tr>
<td>Obsessions</td>
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<tr>
<td>Compulsions</td>
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<tr>
<td>HDRS-17 14.9±8.1</td>
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<td>BAI 18.7±12.5</td>
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<td>BIS-11 62.2±11.6</td>
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<tr>
<td>CI 16.8±4.0</td>
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<td>MI 19.0±4.7</td>
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<td>NP 26.8±4.7</td>
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<td>ADHD + (n, %) 35 (17.9%)</td>
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<tr>
<td>Smoking + (n, %) 60 (30.6%)</td>
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<td>Alcohol or SUDs + (n, %)* 12 (6.1%)</td>
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<td>Tic + (n, %) 8 (4.1%)</td>
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</table>

*Data related to smoking and alcohol or SUDs are missing in a subject.
The aim of our study was to investigate the heterogeneity of ADHD as a comorbidity. However, we failed to find significant differences among the symptom dimensions. We did find that the prevalence of ADHD was 26.3% in the SCRO group, 20.4% in taboo thoughts group, and 11.6% in washing symptom group dimension. It is apparent that these percentages are quite dissimilar: ADHD is two and a half times as prevalent in the SCRO group as in the washing symptoms group and twice as prevalent in the taboo thoughts group as in the washing symptoms group. However, these values were not significant, possibly because of the small sample size. Although a total of 196 patients seem to account for a considerable number, the SCRO group consisted of only 19 subjects, five of whom also had ADHD. Of the 69 patients comprising the washing symptoms group, only eight had ADHD.

In a study detecting the comorbidity of OCD in a sample of 1001 patients, the frequency of ADHD was 13.7% (19). In a bivariate analysis, the odds ratio (OR) was 1.64 for sexual/religious dimension, 1.80 for aggression dimension, 2.17 for hoarding, 2.36 for symmetry/ordering dimension, and non-significant for washing dimension. These results are similar to our findings: symmetry/ordering is associated with the highest risk of ADHD, while taboo thoughts have a lower risk, and washers generally have at no risk at all. However, in the same study, after logistic regression adjusted for sex, age, and all other dimensions, ADHD comorbidity lost its significance except in hoarding that still had an odds ratio (OR) of 2.01. The findings agree with another study, which showed that the ADHD comorbidity is higher in the hoarding symptom dimension than other OCD symptom dimensions patients (20).

It is well established that OCD is associated with abnormalities in various domains of cognitive functioning (21). A meta-analysis of 13 studies (with a total number of 535 patients) assessing the level of neuropsychological functioning in washers and checkers denoted that individuals with washing symptoms had higher neuropsychological performance in most domains than those with checking (21). The domains of planning/problem solving and response inhibition were associated with the largest effect sizes, whereas the effect size was medium in set-shifting/flexibility and small in sustained attention, processing speed, encoding, and verbal and nonverbal memories. Checkers were found to have moderately impaired memories compared to non-checkers (including washers and individuals with other symptom dimensions) in a meta-analysis assessing visual-free recall, verbal-free recall, verbal-cued recall, recall of actions, visual recognition, and working memory (23). Hashimoto et al. (24) compared episodic memories, attention, and executive functions among the three symptom dimensions. The scores on the dimensions of aggression/checking and symmetry/ordering were associated with poorer performances of the logical memory (an indicator of episodic memory) and trail-making tests (an indicator of executive functions, attention, and inhibition), whereas the scores of the washing dimension were associated with better performances on the same tests.

A study recruiting 93 pediatric OCD patients used a neuropsychological battery evaluating verbal memory and fluency, verbal learning, nonverbal memory and fluency, processing speed, and inhibition/switching to compare five symptom dimensions (including our three dimensions). The results indicated that children with the symptoms of symmetry/ordering and hoarding had more severe cognitive impairment than in children with other symptoms (25). All these studies agreed that OCD patients with symmetry and ordering symptoms were more likely to have been afflicted by cognitive impairment particularly in comparison to those with washing symptoms.
It is well established that the frontostriatal circuit is the principal system involved in OCD; it partly explains the cognitive dysfunctioning of OCD patients (26). On the other hand, certain symptom dimensions were shown to be associated with abnormalities in specific anatomical areas concerned with cognitive functioning including executive functions, attention, and memory. Van den Heuvel et al. (27) reported that the washing dimension was negatively correlated with the gray matter (GM) volume in the caudate nuclei and white matter (WM) volume in the right parietal lobe. Furthermore, the aggression/checking dimension was negatively correlated with GM as well as WM volumes of the temporal lobes. The dimension of symmetry/ordering was negatively correlated with the GM volume of the parietal cortex and positively correlated with the GM and WM of the medial temporal lobe (27). GM abnormalities in the prefrontal cortex (28), orbitofrontal cortex (29), amygdala (30), and anterior cingulate cortex (29) were correlated with the different dimensions including aggression/checking, washing, and symmetry/ordering. Functional neuroimaging studies (including positron emission tomography and functional magnetic resonance imaging) found different patterns of regional activity across symptom dimensions, where increased activities were observed in: 1) ventrolateral prefrontal cortex, bilateral ventromedial prefrontal regions, right caudate nucleus, parahippocampal gyrus, anterior and right insula, and several cortico-cerebellar regions and visual regions in washers; 2) orbitofrontal and superior temporal cortex, frontostriatal regions, globus pallidus, putamen, thalamus, and dorsal cortical areas in checkers; 3) right orbitofrontal cortex and left precentral gyrus in hoarders (31-34). A recent study has shown hypoactivation in the left caudate and left anterior cingulate cortex in checkers (35). Checking is furthermore associated with an abnormality in the activation of amygdala (36). This diversity with respect to the involvement of brain areas might account for the variations in the extent of cognitive impairment among distinct symptom dimensions in individuals with OCD.

We did not find any significant difference in impulsiveness—often a component of ADHD—across symptom dimensions, which is consistent with our previous study (37). Most studies have demonstrated an increased rate of impulsiveness in OCD patients compared to controls (38-41). A meta-analysis comparing the neuropsychological performances of washers and checkers revealed that response inhibition—a marker of executive functions including impulsiveness—was more impaired in checkers (22). However, a more recent study found no relationship between response inhibition and symptom dimensions (42).

A significant finding of our study was concerned with the frequencies of smoking. Approximately one third of the patients with washing symptoms and taboo thoughts (30% and 37.1% respectively) were smokers, and smoking was about twice as common among individuals with SCRO (68.2%) as mentioned above. We observed the same results in a former study: 23% in washers, 29.6% in patients with taboo thoughts, and 68.2% in those with SCRO symptoms (37). It appears that increased smoking in a symptom dimension contributes to a higher rate of ADHD. This association may be due to the fact that people with ADHD are exposed to a high risk of smoking (8,43,44). The small sample in the present study may underestimate the possibility of a significant relationship between ADHD and the symptom dimensions.

The small sample size appears to be the most important shortcoming of this study, which limited the analyses of hyperactivity, inattention, and mixed subtypes of ADHD. Another problem was that SCID, which we employed, allows the diagnosis of ADHD below the age of 13 years. Nevertheless, most studies screening or investigating ADHD among adults have used the DSM criteria on which SCID is based (7); therefore, we also followed the same way.

In conclusion, this study did not find a significant difference in the comorbidity of ADHD and OCD among the three distinct symptom dimensions (washing, taboo thoughts, and SCRO) of OCD. Nevertheless, since the prevalence of ADHD showed remarkable variations among these symptom dimensions, though lacking a statistical significance, this topic warrants further research. The distribution of the frequency of smoking among the symptom dimensions showed the same patterns as ADHD. In addition to detecting the co-occurrence of ADHD with specific symptom dimensions of OCD, it will be illuminating to investigate the relationship between the clinical characteristics (age at onset, clinical severity, gender distribution, outcome, etc.) of the two disorders with respect to the symptom dimensions.
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References:


