



# Effect of Obsessive Compulsive Disorder on Word Stem Completion Test (WSCT) and Cognitive Processes

*Obsesif Kompulsif Bozukluğun Kelime Kökü Tamamlama Testi (KKTT) ve Bilişsel Süreçlere Etkisi*

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## ABSTRACT

**Aim:** The aim of this study is to evaluate the relationship between implicit memory performance and cognitive processes in individuals with Obsessive-Compulsive Disorder (OCD).

**Material and Method:** In this study, we aimed to investigate the relationship between implicit memory performance and cognitive processes by comparing a group of 30 Obsessive-Compulsive Disorder (OCD) patients that presented to Yüzüncü Yıl University Medical School Hospital Psychiatry Polyclinic and a group of 40 healthy subjects. Both groups were administered demographic data form and the Word Stem Completion Test (WSCT). The patient group was additionally administered Yale-Brown Obsessive Compulsive Scale (Y-BOCS), Dimensional Yale-Brown Obsessive-Compulsive Scale (DY-BOCS), Metacognitions Questionnaire 30 (MCQ-30), Thought-Action Fusion Scale (TAFS), and Obsessive Beliefs Questionnaire-44 (OBQ-44).

**Results:** It was determined that the increase in Y-BOCS and cognitive parameters (TAFS, OBQ-44, MCQ-30) scores adversely affected the performance of WSCT. The mean WSCT score was  $7.63 \pm 3.05$  in the patient group and  $6.30 \pm 2.09$  in the control group ( $p=0.034$ ). TAF parameter is the most important cognitive parameter affecting implicit memory performance.

**Conclusion:** In OCD, implicit memory performance is adversely affected as the severity of the disease increases.

**Key words:** obsessive-compulsive disorder; implicit memory; thought-action fusion; metacognition

## ÖZET

**Amaç:** Bu çalışmada, Obsesif Kompulsif Bozukluğu (OKB) olan bireylerde örtük bellek performansı ile bilişsel süreçlerin ilişkisinin değerlendirilmesi amaçlandı.

**Materyal ve Metot:** Bu çalışma; Yüzüncü Yıl Üniversitesi Tıp Fakültesi Hastanesi Psikiyatri Polikliniğine başvuran; 30 Obsesif

Kompulsif Bozukluk (OKB) tanılı hasta ve rastgele seçilen 40 kişilik sağlıklı kontrol grubunda örtük bellek performansı ile bilişsel süreçler değerlendirildi. Her iki grup için; örtük bellek performansını değerlendiren Kelime Kökü Tamamlama Testi (KKTT) ve Sosyo-demografik bilgi formu uygulandı. Hasta grubuna ise bu teste ilave olarak, Yale-Brown Obsesyon Kompulsiyon Ölçeği (Y-BOCS), Boyutsal Yale-Brown Obsesyon Kompulsiyon Ölçeği (DY-BOCS), Obsesyonel İnanışlar Ölçeği (OIÖ), Düşünce Eylem Kaynaşması Ölçeği (TAF) ve Üst Biliş Ölçeği (ÜBÖ) uygulandı.

**Bulgular:** Yapılan değerlendirme neticesinde; Y-BOCS ve bilişsel parametrelerin (TAF-OIÖ-ÜBÖ) puanlarındaki artışın KKTT performansını ters yönde etkilediği saptandı. Ortalama KKTT skoru hasta grubunda  $7,63 \pm 3,05$ , kontrol grubunda  $6,30 \pm 2,09$  idi ( $p=0,034$ ). Örtük bellek performansını en fazla etkileyen bilişsel parametre ise TAF parametresi idi.

**Sonuç:** OKB'da, hastalığın şiddeti arttıkça örtük bellek performansı olumsuz etkilediği saptandı.

**Anahtar kelimeler:** obsesif-kompulsif bozukluk; örtük bellek; düşünce eylem kaynaşması; üst biliş

## Introduction

Memory is classified into two types based on the level of consciousness during information processing: explicit and implicit<sup>1</sup>. Explicit memory is defined as the intentional recollection of information while implicit memory reflects the unintentional recollection of information<sup>2,3</sup>. Moreover, while explicit memory is effective in action planning, implicit memory is independent of verbal processing<sup>4</sup>.

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Implicit memory, first defined by Reber in 1967, is highly useful in the acquisition of sportive and motor skills<sup>5</sup>. Studies have shown that performance on implicit memory is unrelated to general intelligence and the cognitive function level<sup>6</sup>.

Obsessive-compulsive disorder (OCD) is a psychiatric disorder characterized by obsessions and compulsions. Obsessions are repetitive and unwanted thoughts, urges, or images, while compulsions are repetitive behaviors and cognitive rituals occurring secondary to obsessions. Memory studies in OCD have primarily focused on the elements of explicit memory such as working memory<sup>7,8</sup>, visual-spatial memory, and verbal memory<sup>9</sup>.

Literature reviews indicate a limited number of studies reporting on implicit memory performance in pre-conscious information processing in OCD patients<sup>10</sup>. While some of these studies have reported that implicit memory is impaired<sup>11</sup>, some others have suggested that it is preserved in OCD patients<sup>12</sup>.

Dysfunctional thoughts have a role in the cognitive models of OCD<sup>13</sup>. Our present study, the implicit memory performance and the cognitive status of the participants were evaluated. We also evaluated the parameters associated with dysfunctional thoughts in patients with OCD, including obsessive beliefs, metacognition, and thought-action fusion (TAF).

## Material and Method

The study included a total of 70 participants comprising 30 patients that were being treated and followed up due to OCD in Yüzüncü Yil University Medical School Training and Research Hospital Psychiatry Clinic and 40 healthy subjects. Local ethics committee approval was obtained before the study (YYU-2012-02). Participation consent form was obtained from the participants.

The criteria for inclusion in the control group were being 18–55 years of age, absence of any psychiatric pathology according to DSM-V criteria, absence of neurological disease and normal mental capacity. Criteria for inclusion in the case group=Obsessive-compulsive disorder diagnosis, absence of psychotic symptoms, normal mental capacity.

The patients were administered sociodemographic data form, Yale-Brown Obsessive Compulsive Scale (Y-BOCS), Dimensional Yale-Brown Obsessive-Compulsive Scale (DY-BOCS), Metacognitions Questionnaire-30 (MCQ-30), Thought-Action Fusion Scale (TAFS), Obsessive Beliefs Questionnaire-44

(OBQ-44) and Word Stem Completion Test (WSCT). In contrast, the healthy subjects were administered demographic data form and WSCT only.

### *Sociodemographic Data Form*

The sociodemographic data form was developed by the researchers to assess patients' sociodemographic (age, gender, marital status, occupation, educational level and status, socioeconomic status) and clinical (prior diseases and OCD-related conditions) characteristics.

### *Yale-Brown Obsessive Compulsive Scale (Y-BOCS)*

Yale-Brown Obsessive Compulsive Scale (Y-BOCS) is a clinician-administered scale for the assessment of the type and severity of OCD symptoms. Y-BOCS consists of 19 items and each item is rated on a scale of 0–4. Adaptation, validity, and reliability studies have been conducted by Karamustafalioglu et al.<sup>14</sup>.

### *Dimensional Yale-Brown Obsessive-Compulsive Scale (DY-BOCS)*

The DY-BOCS is a interview-based scale for assessing the severity of OCD. It has 88-item OCD symptoms checklist for each OCD symptoms dimension.

### *Metacognitions Questionnaire-30 (MCQ-30)*

The term 'metacognition' was first coined by Flavell<sup>15</sup>, referring to one's knowledge concerning the system, structure, and the function of one's own cognitive processes. The short form of the scale has 30 items (MCQ-30).

### *Thought-Action Fusion Scale (TAFS)*

Thought-Action Fusion (TAF) is another cognitive parameter measured in our study. TAF refers to the belief that thinking about an action is equivalent to actually carrying out that action. Thought-Action Fusion Scale (TAFS) consists of 5-point Likert-type items. Adaptation study has been conducted by Yorulmaz et al.<sup>16</sup>.

### *Obsessive Beliefs Questionnaire-44 (OBQ-44)*

Obsessive Beliefs Questionnaire 44 (OBQ-44) is a 44-item scale developed for assessing non-objective belief domains contributing to the conversion of intrusive thoughts to clinical obsessions. The scale consists of 3 subscales: (I) responsibility and threat estimation, (II) importance and control of thoughts, and (III) perfectionism and intolerance of uncertainty. Adaptation, validity, and reliability studies have been conducted by Besiroglu et al.<sup>17</sup>.

### Word Stem Completion Test (WSCT)

Word Stem Completion Test (WSCT) is used for measuring the preparatory effect of repetition on learning and memory. Adaptation study has been conducted by Tavat and Can<sup>18</sup>.

The WSCT test consists working phase and intermediate phase. 25 pairs of words are used in the study phase. Participants evaluate 25 words on the first page with implicit coding at the first part of study phase. In the intermediate step, the names of the famous are given and the participants are asked to fill the surnames of the famous. In the last step of the study phase, the first syllables of the 25 words are given. The 25 completed words are compared to the words on the first worksheet. The participant is asked to fill the first syllables with the first word that will come into their mind. The first two words are excluded due to the primacy effect and the last two words are excluded from the analysis due to the recency effect.

Data were analyzed using SPSS 16.0 for Windows (SPSS Inc., Chicago, IL, USA). Correlations were analyzed using Pearson Product-Moment Correlation Coefficient (PPMCC). A *p* value of <0.05 was considered significant.

### Results

Mean age was  $30.63 \pm 7.95$  years in the patient group and  $31.27 \pm 9.11$  years in the control group. Age had no significant effect on WSCT scores ( $p=0.759$ ) and the correlation coefficient between age and WSCT scores was  $-0.329$ . Moreover, no significant difference was found between the patient and control groups with regard to age ( $t$  test= $-0.307$ ;  $p=0.759$ ). Mean WSCT score was  $7.63 \pm 3.05$  in the patient group and  $6.30 \pm 2.09$  in the control group. The  $t$ -test indicated that the WSCT scores were significantly higher in the patient group compared to the control group ( $t$  test= $2.167$ ;  $p=0.034$ ) (Table 1).

Table 2 presents the correlations between the scores of the scales administered in the patient group and the severity of OCD symptoms. Accordingly, Pearson Product-Moment Correlation Coefficient (PPMCC) indicated a strong negative correlation between WSCT scores and the severity of OCD symptoms. Correlations were found between the OBQ-44, MCQ-30, TAFS, Y-BOCS, DY-BOCS scores and the WSCT scores.

The scores of the scales indicating the severity of OCD symptoms (Y-BOCS and DY-BOCS) and of the scales used for the measurement of cognitive functions (TAFS, OBQ-44, and MCQ-30) increased, the performance on WSCT decreased. Of the cognitive parameters analyzed in the study, TAF was the most effective parameter on the WSCT performance.

**Table 1.** Mean age and WSCT scores in both groups

	Patient group (n=30)	Control group (n=40)	<i>p</i> value
Mean age (years)	$30.63 \pm 7.95$	$31.27 \pm 9.11$	0.759
Mean WSCT score	$7.63 \pm 3.05$	$6.30 \pm 2.09$	0.034

Values are given as mean  $\pm$  standard deviation (SD).  
A *p* value of <0.05 was considered significant.

**Table 2.** Correlation coefficients in the patient group (PPMCC)

	1. WSCT	2. Y-BOCS	3. DY-BOCS	4. OBQ-44	5. TAFS	6. MCQ-30
1. WSCT	-					
2. Y-BOCS	-0.84 **	-				
3. DY-BOCS	-0.83 **	0.96 **	-			
4. OBQ-44	-0.52 **	0.60 **	0.62 **	-		
5. TAFS	-0.78 **	0.74 **	0.77 **	0.80 **	-	
6. MCQ-30	-0.70 **	0.53 **	0.60 **	0.60 **	0.79 **	-

Pearson moments multiplication correlation coefficients calculated between variables in the patient group.

\*\*  $p < 0.05$

Y-BOCS: Yale-Brown Obsessive Compulsive Scale, DY-BOCS: Dimensional Yale-Brown Obsessive-Compulsive Scale, MCQ-30: Metacognitions Questionnaire-30, TAFS: Thought-Action Fusion Scale, OBQ-44: Obsessive Beliefs Questionnaire-44, WSCT: Word Stem Completion Test.

### Discussion

Implicit memory was primarily evaluated in amnesic patients<sup>2</sup>. In these studies, age and the coexistence of dementia were used as the primary criteria for the selection of patients for the evaluation of implicit memory.

Although the WSCT performance can be affected by frontal lobe degeneration, it may not be affected until the age of 70–80 years<sup>19</sup>. Additionally, it has also been shown that the performance on perceptual implicit memory may not be affected even in patients with severe neuropathological symptoms<sup>20</sup>.

Implicit learning is different in adults from that in children. Adults often use explicit memory while children appear to excel in implicit memory for the acquisition of cognitive skills<sup>21</sup>. Moreover, studies have shown that children have a better implicit memory capacity compared to adults<sup>22</sup>.

In our study however, age had no significant effect on the WSCT performance. Meaningfully, the studies indicating a significant effect of age on the WSCT performance have evaluated both children and adults. However, our study had a relatively narrow age range.

Some of the studies investigating the association between implicit memory and OCD have reported that implicit memory is protected<sup>12</sup> while the others have suggested that it is reduced<sup>23</sup> in OCD patients. In our study, the scores of the scales indicating the severity of OCD symptoms (Y-BOCS and DY-BOCS) and of the scales used for the measurement of cognitive functions (TAFS, OBQ-44, and MCQ-30) increased, the performance on WSCT decreased.

The inconsistency among the studies investigating implicit memory performance in OCD patients could be related to the drugs used by the patients included in these studies<sup>24</sup>. Of these drugs, selective serotonin reuptake inhibitors (SSRIs) are known to have a potential to reduce the symptoms and to reverse the hyperactivity in the striatum and associated frontal regions<sup>25</sup>. Based on these findings, it is safe to assert that drug use can increase the WSCT performance. In our study, the patient group was heterogeneous in terms of drug use.

In OCD patients, implicit memory deficits are compensated by the performance on hippocampus-dependent explicit memory<sup>26</sup>. Hypothetically, then, implicit memory performance could have a compensatory effect on explicit memory deficits. In our study, however, no evaluation was performed for explicit memory performance.

There is a positive clinical relationship between OCD and implicit memory. Implicit contextual information is considered to reduce anxiety caused by obsessive behaviors<sup>27</sup>.

In our study, as the Y-BOCS and DY-BOCS scored increased, the WSCT scores decreased, which implies that there is an inverse relationship between the effect on implicit memory functions and the severity of OCD symptoms.

The flexibility in cognitive processes can be affected by OCD. The response of implicit information to a stimulus can be less variable and biased. Explicit memory deficits are mostly seen in patients with repetitive control rituals<sup>28</sup>. Therefore, good implicit memory performance could be expected to reduce the severity of the disorder. According to our study result; the implicit memory performance was impaired with the severity of the disorder.

In our study, the increase in cognitive parameters (thought-action fusion, obsessive beliefs, and meta-cognition) had an adverse effect on the WSCT performance, with the highest effect seen in TAF. This finding could be explained by the relationship between the severity of the disease and these parameters, as in the relationship between the severity of the disease and Y-BOCS and DY-BOCS. The severity of the disease may also be affecting the WSCT performance besides implicit memory performance like explicit memory.

Thought-action fusion (TAF) refers to the tendency to assume that certain thoughts increase the likelihood of catastrophic events. TAF can lead to pathological anxiety and adverse effects even in the absence of obsessive symptoms<sup>29</sup>. TAF is also effective in the etiology and progression of OCD. Additionally, TAF is a fundamental factor that can cause variation in the elements involved in the phenomenology of OCD, such as responsibility and overthinking<sup>30</sup>.

As TAF is independent from obsessive symptoms and has a key role in the progression of these symptoms, it is considered to be dissimilar to other cognitive parameters. Nevertheless, further studies are needed to investigate the relationship between TAF and implicit memory performance.

Our study was limited since the patient group was heterogeneous in terms of drug use and no evaluation was performed for explicit memory performance.

The severity of OCD increases, the implicit memory performance decreases. TAF was found to be the most effective cognitive parameter on implicit memory performance. Further studies evaluating explicit memory performance in patients receiving no pharmacological

treatment are needed to provide a deeper insight into the relationship between implicit memory and the cognitive dysfunction in OCD patients.

### Conflict of Interest

No conflict of interest was declared by authors.

### Financial Disclosure

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