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# Cognitive-Behavioral Therapy of Obsessive-Compulsive Disorder in Children and Adolescents

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## Abstract

While obsessive-compulsive disorder (OCD) is present under the category of anxiety disorders in DSM-IV TR, it is classified under “Obsessive Compulsive Disorder and Related Disorders” in DSM 5. There is no different diagnostic system for children and adolescents. OCD has serious adverse effects on family, school, and social lives of children and adolescents, but adolescents with OCD often hide their symptoms and delay seeking help due to several reasons such as inability to recognize their symptoms as disease manifestations, embarrassment, fear of being stigmatized by other people, and believing that what the experience is transient. The age of onset has significance in terms of the disease progression. Therefore it is very important to detect OCD at its early stage, because the majority of the adult patients develop the disease during childhood or adolescence.

**Keywords:** obsessive-compulsive disorder, child, adolescent, review, psychiatric disorders

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## 1. Introduction

Obsessive thoughts and behaviors are mentioned since ancient times and mentioned on holy books. In Middle Ages, it was thought that people who have religious and sexual unwanted thoughts were taken over by the devil and to be punished by burning. In the seventeenth century, Shakespeare defined a character called Lady Macbeth; she had contamination obsession and hand washing compulsion. In the nineteenth century, Esquirol mentioned from a case report named Matmazel F. Matmazel F was rubbing her fingers and washing her hands constantly because she was thinking that she might be infected with something, and she could not stop herself. Morel used the term of “obsession” first time in 1866. In the twentieth century, Janet stated that the sense of incompleteness is the base of obsessive-compulsive

disorder. Janet handled this disorder under the title of psikasteni and exhibited that rituals could be improved by behavioral technics. S. Freud also stated the psychodynamic basis of the disorder [1].

There are two basic classification systems in psychiatric disorders as the Diagnostic and Statistical Manual (DSM) and the International Classification of Diseases (ICD). Obsessive-compulsive disorder (OCD) has been included in ICD-5 first time among adult mental disorders in 1939, but for children OCD has been included in DSM-II among childhood mental disorders in 1968 and in ICD-9 in 1978 [2–4]. In DSM-IV, differences in childhood OCD patients “like they could not know their obsessions and compulsions” are extremely unreasonable were highlighted [5]. While obsessive-compulsive disorder (OCD) is present under the category of anxiety disorders in DSM-IV TR, it is classified under “Obsessive Compulsive Disorder and Related Disorders” in DSM 5 and hoarding compulsions separated from OCD in DSM 5 into a new disorder, as “Hoarding Disorder.” But in the ICD 10 classification system, OCD is located under “neurotic, stress-related, and somatoform disorders” [6–8].

Obsessive compulsive disorder and related disorders include:

- Obsessive-compulsive disorder (OCD)
- Body dysmorphic disorder
- Hoarding disorder
- Trichotillomania
- Excoriation (skin-picking) disorder
- Substance-/medication-induced obsessive-compulsive and related disorder
- Obsessive-compulsive and related disorder due to another medical condition
- Other specified obsessive-compulsive and related disorders and unspecified obsessive-compulsive and related disorders [8]

OCD is a disorder that is characterized by the presence of obsessions and/or compulsions [8]. Obsessions are intrusive and unwanted thoughts, urges, or images which are recurrent and persistently experienced and caused anxiety or distress. Patients usually try to ignore or suppress these thoughts, urges, or images or try to neutralize them. Compulsions are behaviors or mental acts which are repetitive and performed in response to an obsession or applied as rigid rules. These behaviors or mental acts are performed in order to prevent or reduce anxiety and distress or feared event or situations. These behaviors or mental acts are unrelated with feared events in reality. For this to be diagnosed, it should take a lot of time, for example, more than 1 h per day and cause clinically significant distress or impairment in functioning like social, occupational, or other important areas. Symptoms of OCD must not be related with any substance’s physiological effects, medical conditions, or mental disorders. In DSM 5 diagnostic criteria, OCD could be specified as if with good or fair insight, with poor insight, and with absent insight/delusional beliefs or tic related [8]. Although there is no different diagnostic system for children and adolescents than the adults, it has been stated that young

children may not be able to articulate the purposes of their compulsive behaviors or cognitive actions [8]. Children usually have less insight about the irrationality of their obsessions and compulsions. And at some developmental stages of children, it is hard to distinguish some normative behaviors from OCD. At this point, behavior's impact in child or adolescent's functioning is important; normative behaviors usually do not affect functioning [9].

## 2. Etiology

The etiology of OCD is certainly unknown, but multiple factors like genetic, biological, cognitive, and behavioral are found effective [10]. Also it involves interactions between genetic and environmental factors [11]. Environmental factors such as traumatic life events and stress were found to be effective in 50% of OCD cases [12, 13]. In a twin study, OCD concordance was found approximately 90% in identical twins and 47% in dizygotic twins [14]. And in a twin study, genetic factors were found related with OCD symptoms [15]. In early onset OCD patients, OCD may be almost twice as high through the relatives as late onset OCD patients. This shows that familiarity in early onset OCD patients is higher [16].

OCD is a neuropsychiatric disorder, and basal ganglia dysfunction has been associated with obsessive-compulsive symptoms. In literature there are some studies that found association between OCD and neurological disorders like epilepsy, brain injury, Tourette's syndrome, and Sydenham's chorea [16–19]. Repetitive behaviors in a patient with Sydenham cores were first described by Sir William Osler. During the course of Sydenham's chorea, usually obsessive-compulsive symptoms occur [18, 20]. In literature it was reported that immunologically based group A beta-hemolytic streptococcal infection is an another etiological factor. This disorder is called as Pediatric Autoimmune Neuropsychiatric Diseases Associated to Streptococcal Infections (PANDAS). This disorder leads to an autoimmune inflammation in the striatum and other brain areas and shows some neurologic symptoms like hyperactivity, choreiform movements, and tics. In addition to these, in a certain period, increase of obsessive-compulsive symptoms is observed. This makes researchers to think that Tourette's syndrome, Sydenham's chorea, and OCD have a common etiology [21]. OCD's neural basis is thought to include the circuits of the orbitofrontal cortex, striatum, and thalamus and the neurotransmitters as serotonin, dopamine, glutamate, and gamma-amino-butyric acid [22, 23].

In recent neuroimaging studies, amygdala and prefrontal cortex's role has been found important in mechanism of regulating emotional responses like fear and anxiety [24]. Some evidences showed that there is a reward dysfunction in OCD [25]. Similar to addictive behaviors, compulsive behaviors that cause relief from anxiety and have a rewarding effect were hypothesized. Reward process has been associated with ventral striatal orbitofrontal circuitry and in neuroimaging studies; it was shown that OCD patients had an altered metabolism in this area frequently, and this results supported the hypothesis [26].

As psychoanalytic theory, unresolved oedipal complexes cause anxiety, and this takes place a factor in OCD etiology. According to this theory, as a result of encountering anxiety, people

have a regression to anal period, and some defense mechanisms are commonly used like isolation, doing-undoing, reaction formation, and displacement [27].

There is a little evidence about the cognitive mechanisms of OCD; it is thought that these mechanisms are similar in adults and children. According to cognitive theory, the basis of obsessions is catastrophic interpretation of unwanted and distressing thoughts, impulses, and images. Obsessions are creating anxiety, and by rituals, ruminations, or avoidances, this anxiety is tried to be reduced. For obsession treatment these misinterpretations must be corrected. Also in a study, maternal cognitive biases are found more relevant with younger children's OCD severity; personal cognitive biases are more relevant in adolescents [28].

### 3. Epidemiology

People with OCD seek medical help when their daily functionality is seriously compromised or they experience severe anxiety, and it has been reported that these individuals start seeking professional help after an average of 7 years from the onset of these symptoms. It was found that adolescents with OCD often hide their symptoms and delay seeking help due to several reasons such as inability to recognize their symptoms as disease manifestations, embarrassment, fear of being stigmatized by other people, and believing that what they experience is transient [29, 30]. Furthermore, because adolescents hide their symptoms, it is difficult to determine the actual prevalence of the disorder, and when they seek professional help, they may be misdiagnosed as depression or anxiety disorder due to not mentioning their symptoms [31].

In the past few decades, knowledge of OCD has increased, but studies were mostly done in adult population and less studied in children. Although the first study about the prevalence of OCD in children was reported in 1970, there are few population-based studies presented about the prevalence of OCD in children and adolescents recently [32]. The prevalence of OCD in children and adolescents has been reported between 0.5 and 3% [33, 34]. In a recent study, in 16 European countries, median prevalence of OCD was found 0.7% [35].

It is predicted that OCD is the fourth frequent psychiatric disorder after phobias, substance use disorder, and depression. Studies in different countries and cultures show that OCD prevalence is independent from cultures [27]. Previous epidemiological and clinical studies show that OCD is more frequent among males prior to adolescence and during childhood, the difference between the sexes diminishes to a similar rate as the age advances, and the prevalence rate does not differ between sexes during adolescence and adulthood, and the rates are equal in both sexes at this time [36–46]. Although it was reported in the literature as early as 2 years of age, OCD usually begins at late childhood and early adolescence in youth. Age at onset of the OCD is averagely 10 years old, but age of diagnosis is around 13 years old [47]. Childhood-onset OCD's onset age is approximately 8–11 years old in boys and 11–13 in girls [48].

OCD has adverse effects on family, school, and social lives of children and adolescents [49, 50]. The age of onset has significance in terms of the disease progression. Several studies have detected that OCD often starts at late adolescence and early adulthood period [51, 52].

Studies with adolescents showed that OCD development risk is higher at late adolescence than early adolescence [53]. It is very important to detect OCD at its early stage, because studies indicate that 50% of the adult patients develop the disease during childhood or adolescence [47, 54–56].

#### 4. Clinical features

It is generally considered that in children obsessive thoughts are less common compared to adults; solely compulsive behaviors in the absence of obsessive thoughts are more frequent, while solely obsessive thinking is less common [45]. However, there are studies in literature showing that all children with compulsive aspect of the disease also have accompanying obsessions [57]. Some studies have reported that unlike adults, children may add their families in their rituals, and they cannot describe triggering factors and stressors as well as adults [42].

According to literature, the most common obsessions among children and adolescents include “fear of contamination, dirt, contracting disease”; “fear of aggressiveness, doing harm-receiving harm”; and “need for symmetry, order and precision”, while the most common compulsions are “grooming,” “repeating, and checking” [36, 37, 58, 59]. A study including 44 adolescents, 43 early onset adults, and 45 late onset adult OCD patients reported that religious and sexual obsessions are more common in adolescents than in adult patients, obsessions about contamination are more common in adolescents, and grooming compulsions are more frequent in early onset adults than adolescent patients [60]. Onset of OCD is rare before 6 years old. But in cases that began before 6 years old, symptoms usually began with rituals or hand washing and checking [27]. Childhood OCD in boys is 1.5–2 times more than girls [61]. In boys disorder is more severe, and neurological symptoms and comorbidities are more common [27].

Studies that involved children and adolescents diagnosed with OCD reported the frequency of poor insight with the range of 20–45%. Poor insight in children and adolescents with OCD is associated with severity of symptoms and loss of functionality and has a great influence on duration and success of treatment [62, 63]. Poor insight in OCD causes patients not to recognize their symptoms as a problem and results in reduced treatment motivation and treatment success. Therefore OCD patients with poor insight may be misdiagnosed or may not seek treatment [62, 64].

#### 5. Assessment

The Children’s Yale-Brown Obsessive Compulsive Scale (CY-BOCS) is mostly using tool and often referring as the “gold standard” measurement for assessment of pediatric OCD. It involves two subscales for Obsessions Severity and Compulsions Severity, and total score is estimating with these two subscales [65, 66]. Also there are some other assessment tools

like the Children's Florida Obsessive Compulsive Inventory (C-FOCI), Leyton Obsessional Inventory-Child Version, the Anxiety Disorders Interview Schedule for DSM-IV: Child and Parent Version (ADIS-C/P) which could be used for OCD assessment in pediatric population [67–69].

## 6. Comorbidities

Among children with OCD, 85% of patients have at least one, and 21–75% have at least two or more additional psychiatric diseases [70–73]. The most commonly reported accompanying diagnoses include anxiety disorder and depression [71, 72, 74]. Several studies involving children and adolescents have reported that attention deficit hyperactivity disorder, Tourette's disorder, oppositional defiant disorder, and generalized anxiety disorder are frequent comorbidities [75–78]. In addition to these accompanying disorders, eating disorders, especially anorexia nervosa, can be frequently observed concurrently with OCD in females [79]. Other studies have found association between early onset OCD and somatoform disorders, tic disorder, impulse control disorder, and high resistance to treatment [80–83].

## 7. Differential diagnosis

There are many diagnoses that can be confused with OCD. For example, some anxiety disorders must be considered like generalized anxiety disorder, specific phobia, and social anxiety disorder. In generalized anxiety disorder, recurrent thoughts are usually about real-life concerns as finances and family, but in OCD these thoughts are irrational. Anxiety of patients with specific phobia is more limited with specific objects or situations, and they do not have rituals or compulsions. In social anxiety disorder, fear is limited with social situations. Major depression can be confused with OCD, but obsessions in major depression are usually appropriate with patients' mood, not intrusive or distressing and not related with compulsive behaviors. Some disorders that are under the category of OCD and related disorders like body dysmorphic disorder, trichotillomania, and hoarding disorder can interfere with OCD. In body dysmorphic disorder, obsessions and compulsions are only with physical appearance; in trichotillomania there are no obsessions, and compulsive behaviors are only hair pulling. Hoarding disorder patients have difficulty in discarding or parting with possessions. In consequence objects extremely accumulate, but in OCD obsessions are not typically related with dispose of objects. Although obsessions and compulsions in anorexia nervosa are limited to body image or weight, this disorder can be confused with OCD. Tic disorders also can be misdiagnosed as OCD. Tics are not related with neutralizing obsessions, and tics are less complex than compulsions. Not only OCD but also psychotic disorder patients can have irrational thoughts or delusional beliefs. But OCD patients do not have other psychotic symptoms and recognize that the intrusive thoughts are a product of their own mind. Obsessive-compulsive personality disorder does not have specific obsessions or compulsions but have a resistant perfectionist or controller personality structure. OCD can be confused with some medical conditions because of the results of compulsions like eczema, rashes, and constipation [8, 9, 84].

## 8. Treatment

### 8.1. Cognitive behavioral therapy

Cognitive behavioral therapy (CBT) is recommended for the first-line treatment in mild to moderate OCD, but in moderate to severe OCD cases, it is recommended to support CBT with medication [85].

CBT is a kind of psychotherapy which is developed on the basis of learning theories in psychology and the principles of cognitive psychology. The purpose of this therapy is to change emotions and incompatible behaviors by using psychotherapeutic methods based on these principles [86]. Behavioral therapies began to be used in the treatment of emotional and behavioral problems of young people in the 1950s. These behavioral approaches are based on the theories of Thorndike, Watson, and Bandura, and classical and operant conditioning have been used to treat behavioral disorders seen in infants and children. Cognitive therapies were developed by Aaron Beck in the 1970s and started to be used in the treatment of child and adolescent cases in the 1980s [87].

According to CBT, the mental condition of a person is the result of the mutual interaction of the environment, relationships, the biological structure, emotions, cognition, and behaviors. Psychotherapeutic methods can only be applied to cognition and behaviors of a person [86]. According to learning theory, compulsions reduce distress that triggered by obsession so that negative reinforcement occurs over time (Figure 1) [88].

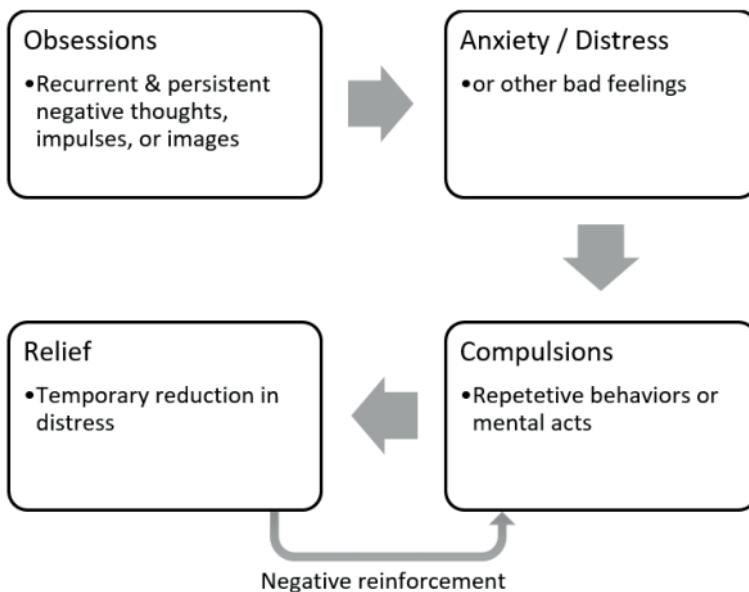


Figure 1. The obsessive-compulsive cycle used by Piacentini et al. [89] to describe OCD's mechanism.

In the CBT, children and adolescents learn to confront with their fears step by step. By learning how to behave against what the OCD tells them, they would understand that their fears do not reflect reality [90]. According to cognitive theory, cognitive processes determine the feelings and behaviors of people. Cognitive processes provide one's interpretation of the external world, surrounding events, own life, and relations with other people. When the basic assumptions and beliefs involved in the cognitive structure that determines the person's view of the world and its interpretations are distorted or functionally improper, a person begins to experience problems [91]. Hence, problems that disturb the person are not due to the events and experiences themselves but due to perception and evaluation of the events and experiences [92]. Instead of these problematic forms of interpretation, cognitive therapy tries to reveal more compatible and appropriate perception and evaluation structures for a situation [93]. Additionally, cognitive therapy emphasizes that improper cognitive structures are an important factor in emerging and maintaining mental disorders. The basic cognitive features of OCD are an overestimation of thoughts and feelings, exaggerated sense of responsibility, perfectionism about controls of thoughts and behaviors, and catastrophic interpretation of possible outcomes of thoughts and impulses, and these features lead to misinterpretations [21]. Cognitive therapy firstly tries to establish connections among emotion, behavior, and thought [94]. According to the cognitive theory, cognition is examined in two sets: automatic thoughts and schemes (Figure 2) [86].

Cognitive therapy deals with automatic thoughts. These thoughts are spontaneous and located in the stream of mind. Also, they are cognitions that are mostly specific to environment and situation that accompanied to moments of emotional distress. Contrary to emotions automatic thoughts are rarely noticed. These thoughts could be verbal or imaginary. There are unsaid

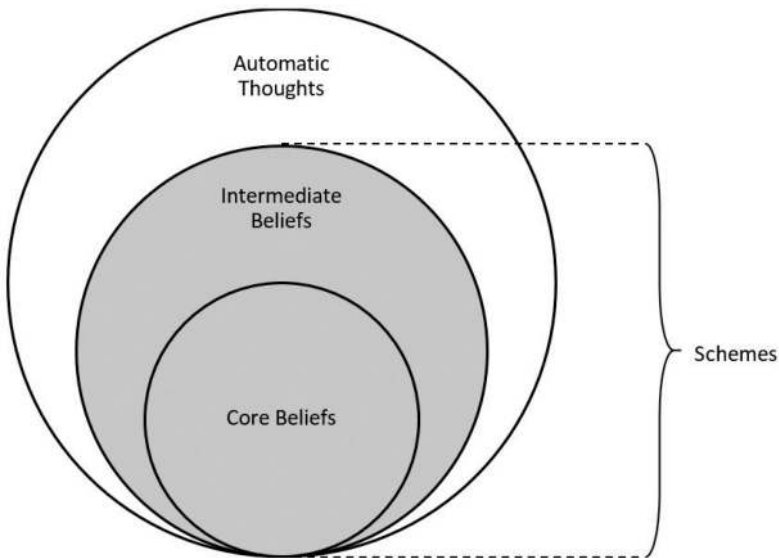


Figure 2. Cognition structure [86].



intermediate beliefs, rules, and assumptions regulating one's behavior underlying automatic thoughts. These are permanent rules and anticipations about the behavior of himself/herself and others, their life, and things that happened to them. Nonfunctional intermediate beliefs lead the therapist to core beliefs that are the deepest cognitive structures. Core beliefs consist of people's early life experiences and their identification with the people around them. These beliefs are reinforced by similar experiences and learnings by time [95]. According to Piaget, the child enters the concrete operational stage around the age of 7–8. Most of the children at the concrete operational stage have the logical processes to take advantage of the cognitive debate. There may be difficulties in cognitive therapy in children who have not reached the concrete operational stage [95]. Children and teenagers often apply to therapy by caregiver's decision. So the first thing to do by the therapists is to introduce themselves and to explain to the child who they are, what they do, and how they can help [93].

The most effective behavioral techniques are a combination of exposure and response prevention. Exposure to anxiety-producing stimulus is advised to a person, and decrease of anxiety is expected after repeated practices. During exposure, the person must prevent rituals and avoidance behaviors. At this stage, response prevention is used. Practices can be in real or imaginary ways. A list should be made of the anxiety-inducing stimuli before practice. Practice starts with easy tasks in the list, and the difficulty of the tasks is increased step by step [27, 96].

CBT session consists of symptom control, review, and getting feedback of homework done; determines the agenda items; configures session content; and determines the new homework, [97]. CBT usually continue 10–14 weeks, with weekly sessions taking 45–90 min [98]. Among the basic principles of the CBT, the first step is psychoeducation. In psychoeducation session, the incidence and prevalence of OCD, age-dependent normal obsessive-compulsive behaviors, OCD's symptoms and disorder's nature in child and adolescent age group, OCD's mechanism, and the impact of factors like developmental level and temperament are given. Also in this session, knowledge of underlying reasons of OCD and basis of cognitive and behavioral therapy, especially exposure and response prevention, and social learning theory, when the medical treatment is needed, are given.

The second step is the diagnostic assessment. There must be a detailed assessment of child's/adolescent's problem and history of coping methods and medical, developmental, family, and school features. Social and cultural characteristics must be considered. Different sources of information such as the clinical interview, parents, questionnaires, and information from school must be integrated. Specific OCD symptoms and comorbidities should be asked. A formulation should be made including protective, precipitating, predisposing, and maintaining factors linked to child/adolescent's situation. The decision should be given about whether an additional medical treatment is necessary. A family assessment involving the capacity to support the child/adolescent of the family should be undertaken. Which family members have become involved in rituals, avoidance behaviors, and obsessions and family functioning must be questioned.

In the third step, emotions, behaviors, and cognitions should be assessed. Anxiety should be explained and normalized in ordinary fear-inducing situations. Furthermore, thoughts,

feelings, and behaviors should be assessed. Detailed list of obsessive ideas and rituals should be done by standardized instruments. Insight level should be questioned. A list of triggers to obsessional fears and compulsive behaviors/rituals and avoided situations should be generated. Cognitive and behavioral rituals used to reduce discomfort should be identified. By using scales appropriate for the age such as “fear thermometer” or “SUDS ratings” anxiety levels should be rated, and child/adolescent should rate how difficult to resist OCD symptoms. For exposure and response prevention, targets should be identified.

The next step is intervention stage. At this step, OCD and intervention rationale should be explained. OCD could be explained by age-appropriate metaphors. With positive reinforcement like praise, awards, and “certificates of achievement,” engagement to therapy should be increased. OCD symptoms are tried to be externalized by giving a nickname to OCD, using “boss back OCD” strategy, being child/adolescent’s ally in fighting OCD and figuring out strategies for fighting OCD. Constructive self-talk might be helpful for coping, and cognitive reconstruction would be useful for unhelpful assumptions underlying the obsessions. In the exposure trials, a child/an adolescent creates a hierarchic list of anxiety situations. Mutually agreed targets are chosen from the list, and those targets are worked together. A direct exposure method is implemented on the agreed targets, and enough exposure time is allowed for habituation. In this process, anxiety levels are rated. Graded exposure including imaginal exposure, exposure to cartoons or images of the feared trigger, is used in the session [99]. The exposure trial is continued until distress ratings decrease by 50% [100]. By agreeing on realizable daily homework tasks, chances of success are maximized.

For ritual prevention, a plan will be made as delaying, shortening, doing differently or performing the ritual slowly. Also, self-monitoring and recording rituals are a part of the exposure process. During response prevention, child’s/adolescent’s anxiety is measured by the fear thermometer. Then relapse prevention is used. The distinction between “lapse” and “relapse” is explained to child/adolescent and parents. For any future OCD symptoms, a rehearsal is made for remembering and using CBT techniques. Family members are included in the intervention as “coaches” for supporting children during exercises, and it is important to work with the school [99]. When CBT is implemented, escape, avoidance, and security search behaviors must be considered because these behaviors are the factors leading to anxiety [101].

Child/adolescent is trained for some anxiety management strategies like breathing and relaxation techniques [102]. CBT could be implemented in groups. Studies show that group CBT programs are more comfortable for patient children because of seeing other children with the same problem [90]. The developmental characteristics as a level of autonomy and dependence of the child should also be considered when CBT is applied [101]. The level of language development during therapy can cause problems. They may not express their feelings verbally. For this reason, first of all, emotional words and concepts should be studied with comics, pictures, heroes, and narratives [93]. And cognitive behavioral play therapy can be applied while working with very young children [101].

## 8.2. Medical treatment

In OCD's pharmacological treatment, fluoxetine, sertraline, and fluvoxamine as selective serotonin reuptake inhibitor (SSRI) and clomipramine as nonselective serotonin reuptake inhibitor have the approval of US Food and Drug Administration for child and adolescents. Which serotonergic drug is the first choice is unknown. But clomipramine's effect was found superior than SSRIs [103]. Clomipramine is considered as the gold standard medication in pharmacological treatment of OCD; however, 46–74% of adolescent OCD patients have been reported to benefit from this drug [104]. Studies indicate that selective serotonin reuptake inhibitors (SSRIs) are superior to placebo for treatment of childhood OCD [103].

Some supportive strategies can be applied in case SSRI treatment is not adequate. These supportive methods include options like addition of CBT, risperidone, clonazepam, clomipramine, aripiprazole, or memantine to the treatment [105, 106]. Medication augmentation is recommended for cases which have moderate impairment persists in at least one functioning area despite adequate monotherapy. Treatment resistance can be described as failing  $\geq 2$  adequate SSRI monotherapy treatment, 1 SSRI and a clomipramine trial, and failure of adequately delivered CBT [85].

In augmentation strategy especially clomipramine and the atypical antipsychotics are commonly used [107, 108]. And also some other drugs like stimulants, gabapentin, sumatriptan, pindolol, inositol, opiates, St. John's wort, N-acetyl cysteine, memantine, and riluzole, without evidence-based results, have also been tried [109].

Adding clomipramine to an SSRI (often fluvoxamine at low doses like 25–75 mg/day) could be a useful augmentation strategy. But practitioner must be careful about adding clomipramine to fluvoxamine or to other CYP-450 2D6 inhibitors like fluoxetine or paroxetine to prevent potentially toxic serum clomipramine levels which would cause cardiological side effects and must follow up with electrocardiography. In augmentation therapy, mostly atypical antipsychotics are chosen. This strategy can improve oppositional behaviors which are caused by increased anxiety level [85]. Riluzole is a "glutamatergic modulator" which effects on glutamate release and increases the level of  $\alpha$ -amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid trafficking and amino acid transporters that stimulates neuroglia [110]. Riluzole has FDA indication only in amyotrophic lateral sclerosis, but there are no indications for childhood conditions. Recently, riluzole was studied in a few open-label trials for generalized anxiety disorder, major depressive disorder, bipolar depression, and OCD in adults, and these results showed riluzole's beneficial effects, and it was well tolerated [111]. In an open-label trial of riluzole of childhood OCD, four of six patients' OCD symptoms had improved significantly. In this study riluzole was well tolerated, and there were no any side effects seen in children [112].

In a study that includes 17 children and adolescents between aged 8 and 18 years with a primary diagnosis of OCD, effectiveness of D-cycloserine (DCS)-augmented CBT for children and adolescents was investigated. Results of this study showed DCS-augmented exposure, and response prevention produced significant improvements in OCD severity relative to a

placebo control in severe and difficult-to-treat pediatric OCD [113]. Lamotrigine is an anti-epileptic drug and also a mood stabilizer that decreases extreme glutamate release [114, 115]. Thus Lamotrigine could be a good augmentation agent in refractory OCD cases. Except those studies, there is a case report that aripiprazole was used with clomipramine, which showed remarkable improvement [116].

## 9. Conclusion

OCD is an important psychiatric disorder in childhood and adolescence. At this age OCD is common, but the diagnosis is often missed. For this reason OCD usually shows chronic progress and serious loss of function. OCD could be confused with other diseases, or comorbidities could be seen. These conditions make it difficult to treat the disease. Although the disease has not completely recovered by the treatment, symptoms can be improved, or functionality may improve somewhat.

OCD could not be as well-defined as adults. Therefore more clinical studies are needed. These studies lead to a better understanding for etiology, treatment, and course of OCD. With the new treatment approaches, OCD could be treated at early age period, and chronicity could be preventable. Thus the incidence of OCD in adulthood may decrease, and it may increase patients' quality of life.

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