

Brain structures associated with obsessive-compulsive disorder

MILIND PARLE AND UDAY GAIKWAD

Pharmacology Division, Department of Pharm.Sciences (Accredited by NBA), Guru Jambheshwar University of Science and Technology (Accredited as 'A' Grade by NAAC), HISAR (HARYANA) INDIA

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Obsessive-Compulsive Disorder (OCD) is characterized by absurd, recurrent and uncontrollable thoughts (obsessions), which are followed by persistent urges to perform certain stereotyped actions (compulsions). The repetitive actions performed by OCD patients serve to neutralize the anxiety precipitated by obsessions. Most of the patients suffering from OCD realize the irrational nature of their thoughts and rituals but feel hopeless and helpless in controlling them. The probable causes of OCD include heredity, brain damage due to accidents/infection, abnormal brain glucose metabolism and serotonergic dysfunction. The brain regions impaired in OCD include basal ganglia, orbito-frontal cortex, anterior cingulate cortex, dorsolateral prefrontal cortex, amygdala, thalamus and brainstem. The repetitive rituals (compulsions) and aggressive behavior, which is predominant in OCD patients is probably due to serotonin depletion. Entire brain functioning is disturbed in patients suffering from OCD, thereby producing devastating effects at the work-place as well as at homes of the patients.

Background:

Obsessive-Compulsive Disorder (OCD) is characterized by absurd, recurrent and persistent thoughts (obsessions) followed by certain stereotyped actions (compulsions). The Patients affected by OCD feel compelled to carry out certain stereotyped actions, although they recognize that their behavior is at times irrational. The repetitive actions performed by OCD patients serve to neutralize the anxiety precipitated by obsessions. OCD may be defined as the triggering in the mind of uncontrollable, egodystonic and recurrent thoughts, impulses or images.

Obsessive-Compulsive disorder can impair all areas of brain and produce devastating effects on patients and their families. The brain regions impaired in OCD include basal ganglia, orbito-frontal cortex, anterior cingulate cortex, dorsolateral prefrontal cortex, amygdala, thalamus,

brainstem and striatum. Selective serotonin reuptake inhibitors (SSRIs) and to some extent tricyclic antidepressants form the main stay in the symptomatic treatment of OCD. However, none of the above medicines provide complete relief and permanent cure from OCD. Therefore, there is a great challenge before neurobiologists to discover new strategies for the management of OCD.

Brain structures associated with OCD : *Dorsolateral prefrontal cortex (DLPC):*

It is the most important cortex part for cognitive functions in human beings. The involvement of the DLPC in working memory was initially demonstrated in primate studies. The DLPC also plays a role in adaptation to changes in the environment. DLPC plays a crucial role in focusing attention on specific stimuli and in decision-making (Miller, 1999). Lesions of DLPC disturb the subject's ability to process temporal information and impair the successful performance of goal-directed behaviors. Functional neuroimaging data have shown diminished activity in the DLPC of patients suffering with psychiatric disorders such as major depression and OCD, which may account for the difficulty in overcoming compulsive behaviors (Saxena *et al.*, 1998).

Anterior cingulate cortex (ACC):

Neuroimaging studies indicated that the ACC is involved in a variety of cognitive processes such as attention, motivation, reward, error detection, working memory, problem solving and action-plan (Bush *et al.*, 2000). There are two major regions within ACC *viz.* a dorsal region, known as the cognitive region, and a ventral or affective region. The cognitive region is a part of attentional network and is closely connected with the DLPC, premotor, and parietal cortices whereas, the affective region is linked to the amygdala, nucleus accumbens, hypothalamus, anterior insula, hippocampus and OFC and sends projections to the neuro-vegetative,