

■ REVIEW ARTICLE

Cognitive Impairment and Dementia in Frontal Lobe Syndrome Leading to Violent Behaviour: A Review Literature

Apoorva Tiwari

ABSTRACT

Studies have shown that, according to reports, people with frontal syndrome have anti-social and violent behaviours.¹ There are many neurobiological and neuropsychiatric reasons behind the increase in criminal activity. Frontal lobe syndrome can occur in stroke, head injury, degenerative changes, and multiple sclerosis and so on. Frontal lobe syndrome can damage the amygdala or orbital cortex, leading to the behaviour of people with mental illness.¹ The purpose of this review is to focus on the need to identify executive dysfunction, cognitive impairment, and dementia that often lead to violent behaviour. This review was conducted through exhaustive researches in different databases using the keywords frontal syndrome, violent behaviour, and cognitive dementia. The conclusion is that frontal syndrome plays an important role in the execution of violent and anti-social behaviours.

KEY MESSAGES: Frontal lobe syndrome cause loss of functions like judgment power, cognition, dementia which causes personality change leading to antisocial behavior.

KEYWORDS | frontal lobe syndrome, cognition, dementia

Author's Credentials:

Assistant professor, Department of Physiotherapy, Sharda University, Greater Noida, Uttar Pradesh 244001, India.

Corresponding Author:

Apoorva Tiwari, Assistant professor, Department of Physiotherapy, Sharda University, Greater Noida, Uttar Pradesh 244001, India.

Email:

apoorva.tiwari@sharda.ac.in



How to cite this article

Apoorva Tiwari. Frontal Lobe Syndrome: Cognitive Impairment and Dementia in Frontal Lobe Syndrome Leading to Violent Behaviour: A Review Literature. *Indian J Forensic Med Pathol.* 2021;14(3 Special):695-697.

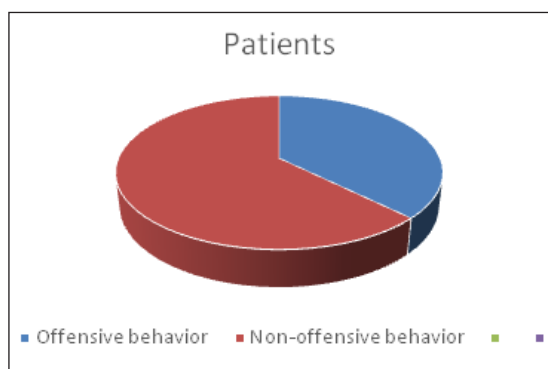
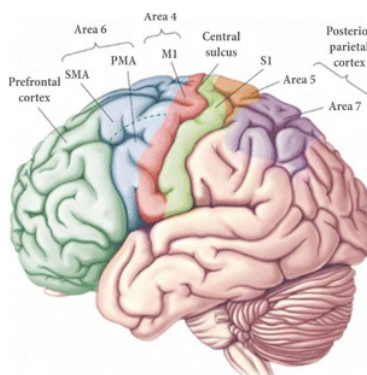
INTRODUCTION

FRONTAL LOBE SYNDROME IS A CLINICAL DISORDER that causes damage and dysfunction of the prefrontal cortex and interferes with higher brain functions (such as social behavior, motivation, planning, and judgment).¹ It is characterized by the behavior and personality alterations with time. Cognitive decline and dementia are reported to be present among patients and can lead to behavior changes, which are anti-social and violent and enhances the tendency of criminal activities, large personality changes can be seen in patients with frontal lobe syndrome.¹ It is a rare clinical disease where forensic psychiatric evaluation has not been yet concluded completely and still going on, therefore it is necessary to review the research on offensive behavior patterns in patients with frontal lobe syndrome.

Pathophysiology and characteristics of Frontal Lobe Syndrome

There are multiple reasons which causes frontal lobe syndrome such as head injury, Cerebrovascular event, infection, neoplasm, many degenerative disorder specifically Pick's bodies in which patients complain of dementia.² The prevalence of frontal lobe syndrome is found to be 19% due to degenerative disorders.² Its characteristics features are following discussed. Patients are reported to be present with decreased lack of spontaneous activity in which planning executions, interest in activities were in process of deterioration and there was increasing periods of restlessness. Such patients are easily distractible and are present with loss of memory.³ Also change of affect in which patient either behaves apathetic and flat or becomes over exuberant and childish or uninhibited with possibly inappropriate sexual behavior.⁴

Cognitive Impairment



Source: Google image

Cognition is the ability to think, calculate, and create abstract thoughts, judgmental behaviour, attention and orientation towards time place and environment. Mini mental status examination is used as measuring scale to check or quantify patients' cognitive ability. It is due to ability to think which supports our behaviour system in social as well as in personal life. It has been reported in studies that there is random decline in cognitive ability of patient in case of frontal lobe syndrome. Although in cognitive function of brain all four lobes that is frontal, temporal, occipital and parietal participates and help us in providing the thinking ability, but in frontal lobe specifically ventromedial part of frontal lobe contributes for the formation of emotion, judgmental ability, personality development and behaviour. According to studies it has been shown that cognitive impairment has been directly found to be involved in psychological disorders leading to various kinds of criminal activity. Cognitive impairment is found to be directly co related with schizophrenia which cause a person to suffer with mental disability,⁵ decline in behaviour execution abilities, and presence of stress factor leaving the patient with depression or anxiety. Cognitive ability is also found to be decrease in bipolar disorder, in which patient for a time period is in state of depression and for other moment suffers from anxiety disorders. There are different scales and parameters which are used to establish co relation between cognitive impairment and neuropsychological disorders.

Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) is one of the important scales which are used to check the neuropsychological states in cognitive impaired patients.⁴ In various studies it has been reported patients suffering from cognitive impairment and offending different crimes were used to score high on scale of Repeatable Battery for the Assessment of Neuropsychological Status scale. Hence in absence of proper cognition patients are found to be involved in various criminal acts leading to be involved criminal acts leading to anti-social and violent behaviour.

Demographic aspects of criminal behaviour

Frontal lobe syndrome can lead to dysfunctions in neural structure which results in impaired judgment, executive function, emotional processing, sexual behaviour and violence such dysfunctions can lead to antisocial and criminal behaviour. As shown in fig. 1, in a case study it was found that out of 171 patients 64 (37.4%) frontal lobe syndrome were presented with complain of criminal behaviour during the phase of their illness.⁵ Specifically behavioral variant of frontal lobe syndrome were more found to be involved in offensive behaviour. Different types of criminal activity have been reported in patients of frontal lobe syndrome few examples are homicide, hyper sexuality, traffic violations and theft. The behaviour pattern of patients poses huge burden on family, hospital staff and society.

Dementia

Frontal lobe dementia is an umbrella term

which involves different kind of brain disorders. Patients with frontal lobe dementia have dramatic changes in their personality and becomes socially inappropriate, impulsive and emotionally indifferent. The common behavioral changes are following when a patient is suffering from frontal lobe dementia.

- Remarkable increase in anti-social behaviour.
- Reduction of interpersonal skills that is having sensitivity to another's feelings.
- There is phase of apathy.
- Lack of judgment and loss of inhibition

So all such behavioral changes are enough to provoke a person to perform antisocial activity and violence in society and hence increasing the criminality rates.

Executive Functions and Aggressive Antisocial Behaviors

Frontal lobe syndrome leads to impaired cognitive function associated with aggressive antisocial behavior.⁶ Executive function is the ability to control thought processes and behaviors in an adaptive and goal-oriented manner. Therefore, exaggerated antisocial behavior can be conceptualized as the result of executive function deficits, especially impaired ability to suppress violent impulses. Studies have found that juvenile offenders and people involved in criminal activities related to frontal lobe syndrome also have intellectual disabilities and key intellectual functions. The orbitofrontal cortex or prefrontal cortex is damaged. This part of the frontal and limbic system can cause severe depression, expression of fear, and lack of confidence and complexity. This personality change can lead to violent and anti-social behaviors, as well as responsible and kind behaviors that lead to emotional, impatient and disrespectful behaviors, thereby increasing social crime. The prefrontal cortex controls the limbic system related to the control and correct

execution of emotions. Any damage to this part of the brain will lead to increased anger and anger. Therefore, damage to the frontal cortex can lead to changes in certain social and personality characteristics.

CONCLUSION

Frontal lobe syndrome found to cause dramatic changes in personality, judgment, cognitive decline, and dementia. The limbic system plays an important role in the control and execution of emotional behaviors, frontal lobe injuries have been found to involve the limbic system, causing patients to become irritable, depressed and lead to antisocial behaviors. Damage to the ventromedial orbitofrontal cortex leads to dramatic changes in behavior patterns, leading to impulsivity and poor judgment. Figure 2 is representing brodmann area 10-frontopolar prefrontal cortex, broadmann area11-orbitofrontal cortex, and broadmann area 47-lateral surface of frontal lobe are closely related to the loss of inhibition of emotional responsibility and the inability to function normally in social interactions.⁷ This review is limited and focuses more on the relationship between frontal lobe syndrome and antisocial behavior. A research based review that includes comprehensive mental health and its importance in controlling behavior patterns is the future scope of this research. **IJFMP**

Acknowledgment:

The author would like to thank all his colleagues and family who encouraged him to do this review.

Conflict of Interest:

The authors declare that there is no commercial or financial links that could be construed as conflict of interests.

Source of Funding: None

REFERENCES

1. **Stone, Jon, Townen E, Kwan J.** Personality change after stroke: some preliminary observations. *Journal of Neurology, Neurosurgery & Psychiatry.* 2004; 75(12):1708-1713.
 2. **Reber J, Tranel D.** Frontal lobe syndromes. *Handbook of clinical neurology.* 2019;163:147-164
 3. **Wallinius, Märta, Nordholm Johannes, Wagnström Fredrik, and Billstedt Eva.** Cognitive functioning and aggressive antisocial behaviors in young violent offenders. *Psychiatry research.* 2019; 272:572-580.
 4. **Dunham, J Kathryn, Shadi Sarah, A Channing, Sofko, L Robert.** Denney, and Calloway Jordan Comparison of the repeatable battery for the assessment of neuropsychological status effort scale and effort index in a dementia sample. *Archives of Clinical Neuropsychology.* 2014;29(7):633-641.
 5. **Liljegren, Madeleine, Naasan Georges, Temlett Julia, David C. Perry, P Katherine .** Rankin, Merrilees Jennifer, Englund Elisabet, Criminal behavior in frontotemporal dementia and Alzheimer disease. *JAMA neurology.* 2015;72(3):295-300.
 6. **Sener, Talip Mustafa.** Criminal responsibility of the frontal lobe syndrome. *The Eurasian journal of medicine.* 2015;47(3):218
 7. **Adolphs, Ralph, Gläscher Jan, Tranel Daniel.** Searching for the neural causes of criminal behavior. *Proceedings of the National Academy of Sciences.* 2018;115(3): 451-452
-
- 