Asian Journal of Education and Social Studies

Volume 50, Issue 6, Page 250-253, 2024; Article no.AJESS.117049
ISSN: 2581-6268

Neurological Basis in Schizophrenia

Prathham Arora [a*] and Kaushlendra Mani Tripathi [a]

[a] Amity Institute of Psychology and Allied Sciences, Amity University Noida, Uttar Pradesh, India.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/ajess/2024/v50i61411

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/117049

Original Research Article

Received: 10/03/2024
Accepted: 13/05/2024
Published: 18/05/2024

ABSTRACT

The aim of the article is to investigate the neurocognitive basis of schizophrenia. Schizophrenia is a group of psychotic disorders in which personal, social, occupational functioning of the individual deteriorate. Schizophrenia is characterized by having Positive, Negative and Psychomotor symptoms. The previously known casual factors include Hormone Imbalances, Physical Deprivation, Pregnancy or delivery complications, Psychological Stress, Faulty Learning patterns etc. The research was undertaken as a secondary research measure wherein 15 published research articles were reviewed to understand and analyse the various precipitating and neurological basis that may lead to schizophrenia. In order to investigate the various causal factors, a variety of neuroimaging techniques including EEG, fMRI, MRI, Post-mortem analysis were undertaken. The findings revealed that various sub-domains including Prenatal, Genetics generally provide the huge understanding that the disorder will be developed.

Keywords: Schizophrenia; secondary research; neuroimaging techniques; positive and negative symptoms.

**Corresponding author: Email: prathamarora0707@gmail.com;*

Cite as: *Arora, P., & Tripathi, K. M. (2024). Neurological Basis in Schizophrenia. Asian Journal of Education and Social Studies, 50(6), 250–253. https://doi.org/10.9734/ajess/2024/v50i61411*

1. INTRODUCTION

Schizophrenia is a group of psychotic disorders in which personal, social, occupational functioning of the individual deteriorate. The person is characterized by having vague thoughts, irregular speaking patterns, deteriorated speech along with certain motor abnormalities and disorganized perception.

Schizophrenia is characterized by having Positive, Negative and Psychomotor symptoms. Positive symptoms include addition to the perception of the individual. These are bizarre additions to the perception. It includes *Delusions* and *Hallucinations* which are a distorted addition to the perception of the individual. Negative symptoms include deficits that are added to the functioning of the individual. These include, *Poverty of Speech, Blunted affect.* People also experience *Poverty of Speech*. Psychomotor symptoms are the symptoms in which the individual make odd gestures. Generally, patients attain extreme formations which are articulated under the category of *Catatonia*

The some of the causal factors include.

The biological viewpoint: These include the following possibilities that might be affecting the normal functioning:

Hormonal imbalances: Decreased levels of Dopamine and increased levels of serotonin.

Genetic vulnerabilities: Increased incidence of the symptoms when one of the family members suffers or has suffered from schizophrenia.

Physical deprivation: Viral infection and accident.

Brain dysfunctions: Enlarged ventricles and increased tissue volume.

Psychological factors: These include factors that result from the psychological imbalance of the individual caused by the following:

►Pregnancy and delivery complications

►Family instability

►Psychological Stress

►Comorbidity with other disorders like ADHD (attention deficit hyperactivity disorder)

►Faulty learning

Environmental instability:

Socio-cultural factors: Increased incidence of schizophrenia because of the poverty and low level of cultural and social representation.

Stressful-life events: Acute stress can precipitate psychotic problems and it can also increase the incidence of these disorders and can cause relapse which might affect the overall condition of the individual.

2. MATERIALS AND METHODS

2.1 Research Design

The study aims to investigate the neurological basis of schizophrenia. The neurological basis of schizophrenia was measured by multi-modal neuroimaging techniques. The quantifiable nature of various techniques makes the research Quantitative in nature. Additionally, as the data was collected from the previously undertaken research endeavors, the present study is secondary in nature due to data collection approach [6-10].

2.2 Population and Sample

The population of the study is the patients who are suffering from Schizophrenia. There are a number of studies on various other mental health disorders but quite a handful of them are present in the domain of schizophrenia as it's a highly mysterious disorder with scattered reasons for precipitation of the disorder. Therefore, the present research aimed to investigate the neurological basis of schizophrenia. The final sample included 15 research articles with a data range of 2011-2019 solely dedicated to studying the neurological reasons leading to schizophrenia.

2.3 Methodology

The methodology included variety of multi-modal neuroimaging techniques like, Electro Encephalogram (EEG), Magneto Encephalogram (MEG), Magnetic Resonance Imaging (MRI), Functional Magnetic Resonance Imaging (fMRI), Positron Emission Tomography (PET), Single Photon Emission Computed Tomography (SPECT), Post-mortem analysis, Morphology and Migration

3. RESULTS

The research was secondary research, thus the data was observed and collected from 15 previously published research papers.

The methodology to investigate the precipitating factors for schizophrenia included, EEG, fMRI, MRI, PET etc.

The results from the studies provided a linear and diverse picture for the development of pathological symptoms of schizophrenia.

Certain of them include:

Modifications in the neurotransmitters, maturation of white and grey matter fibers and breaking down of cortical connections affect the neurological oscillations which have direct impact for the incidence of schizophrenia [11-14].

Schizophrenia is characterised by increased incidence of GABAergic inhibitory neurons which cause decreased NMDA receptors to activate.

22q11.2 is a factor of gene that affects the body to develop schizophrenic symptoms.

DISC1 (Disrupted in Schizophrenia 1) acts as the protein in the cell that interacts and affects the function of different proteins along with its locations. DISC1 is the hub of various psychiatric illnesses including schizophrenia.

The NRG1 with the rs3924999 have a susceptibility of schizophrenia before the age of 25 years.

4. DISCUSSION

The above-mentioned review shows the various neurological casual factors associated with schizophrenia. They include diverse basis from prenatal to the hormonal and genetical to immunal responses of the body [15,16].

The findings show that severity of the causal factors determines the prognosis of the disorder.

The main implications which can be seen are as follows;

Neurological transmitters: GABAergic hormone, Dopamine levels, Serotonin levels, Glutamate levels are responsible for the symptoms to appear.

Prenatal: Inflammation in the prenatal development, acute stress, prenatal infection and immunal alterations can cause brain deficits.

Genetics: The neural oscillations, which coordinate normal brain functioning when experience fault age due to cognitive dysfunction and reduction in amplitude can cause psychotic symptoms.

Hormonal: 2q11, anti-NMDA, Hyperactivity of dopamine receptors (D2+), DISC1-rs821616 and various associated hormones can be detrimental factor neurological deficits causing schizophrenia.

5. CONCLUSION

The main agenda of secondary research was to identify the neurological basis of schizophrenia.

Schizophrenia is a disorder which is considered as a spectrum because it contains variety of symptoms, from positive, negative and psychomotor.

Positive symptoms: cause addition to the perception of the individual like delusions and hallucinations.

Negative symptoms: cause impairment in the perception of the individual like alogia, loss of speech etc.

Psychomotor symptoms: include body rigidity and attaining such positions for long durations.
Schizophrenia has a variety of causal factors but too much of those are still unknown if known much research shedding light on it is not affirmed.

But of the factors include:

Prenatal infection, inflammation and immune alterations.

Genetic which include 1st and 2nd cousins have the vulnerability of this disorder.

Acute life stress can cause the vulnerable person to develop the disorder.

Neurological transmitters like GABAergic, Dopamine, serotonin etc.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Berridge JM. Dysregulation of neural calcium signaling in Alzheimer disease, bipolar disorder and schizophrenia. Prion. 2013;7(1):2-13.
2. Bradshaw JN, Porteous JD. DISC1-binding proteins in neural development, signaling and schizophrenia. Neuropharmacology. 2012;63(3):1230-1241.
3. Fineberg MA, Ellman ML. Inflammatory cytokines and neurological and neurocognitive alterations in the course of schizophrenia. Biological Psychiatry. 2013;73(10):951-966.
4. Fross-Feig HJ, Adkison DB, et al. Searching for cross-diagnostic convergence: Neural mechanisms governing excitation and inhibition balance in schizophrenia and autism spectrum disorders. Biological Psychiatry. 2017;81 (10):848-861.
5. Goghari MV, Sponheim RS, et al. The functional neuroanatomy of symptom dimensions in schizophrenia: A qualitative and quantitative review of a persistent question. Neuroscience and Biobehavioral Reviews. 2010;34(3):468-486.
6. He BS, Zhang LY, et al. Association of the DISC1 and NRG1 genetic polymorphisms with schizophrenia in a Chinese population. Gene. 2016;590(2): 293-297.
7. Howes DO, McCutcheon R. Inflammation and neural diathesis stress hypothesis of schizophrenia: A reconceptualization. Translational Psychiatry. 2017:E1024.
8. Maia VT, Frank JM. An integrative perspective on the role of dopamine in schizophrenia. Biological Psychiatry. 2017;81(1):52-66.
9. Paternoster V, Svanborg M, et al. Brain proteome changes in female Brd1+/− mice unmask dendritic spine pathology and show enrichment for schizophrenia risk. Neurobiology of Disease. 2019;124:479-488.
10. Pollak AT, McCormack R. et.al. Prevalence of anti-N-methyl-D-aspartate (NMDA) receptor antibodies in patients with schizophrenia and related psychoses: A systematic review and meta-analysis. Psychological Medicine. 2013;44(12): 2475-2487.
11. Stahl MS. Beyond the dopamine hypothesis of schizophrenia to three neural networks of psychosis: Dopamine, serotonin, and glutamate. CNS Spectrums. 2018;23(3):187-191.
12. Uhlhaas JP. Dysconnectivity, large-scale networks and neuronal dynamics in schizophrenia. Current Opinion in Neurobiology. 2013;23(2):283-290.
13. Uhlhaas JP, Singer W. Abnormal neural oscillations and synchrony in schizophrenia. Nature Reviews Neuroscience. 2010;11:100-113.
14. Uhlhaas JP, Singer W, et al. The development of neural synchrony and large-scale cortical networks during adolescence: Relevance for the pathophysiology of schizophrenia and neurodevelopmental hypothesis. Schizophrenia Bulletin. 2011;37(3):514-523.
15. Yang X, Song Y, Zou Y, Li Y, Zeng J. Neural correlates of prediction error in patients with schizophrenia: Evidence from an fMRI meta-analysis. Cerebral Cortex. 2024 Jan;34(1):bhad471.
16. Pagonabarraga J, Bejr-Kasem H, Martinez-Horta S, Kulisevsky J. Parkinson disease psychosis: From phenomenology to neurobiological mechanisms. Nature Reviews Neurology. 2024:1-6.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/117049