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REVIEW ARTICLE

Anhedonia in Relatives of Schizophrenic Patients

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ABSTRACT

Background: A serious mental condition with a wide range of intricate symptoms is schizophrenia. It has resulted in a significant healthcare burden and affects approximately 1% of the population. Since schizophrenia is a disorder that relapses quickly, it is recommended that patients receive long-term treatment. There was a notable family aggregation of schizophrenia in the risk of schizophrenia among first-degree relatives. In monozygotic twins, the susceptibility to schizophrenia was more markedly heritable. Patients with FDR of schizophrenia are ten times more likely to develop schizophrenia than the general population. Nonetheless, research has demonstrated that individuals with FDR who subsequently developed schizophrenia display abnormalities in brain structure, function, and neurochemical properties before the onset of schizophrenia. This suggests that some of the abnormalities in schizophrenia may also be present in FDR and could serve as risk factors for schizophrenia development, relatives of schizophrenic patients are at high risk of developing physical anhedonia than normal population which may be used as a useful indicator of liability for schizophrenia among the relatives of affected population. Anhedonia is considered a biological vulnerability marker of schizophrenia spectrum pathology. Anhedonia has a detrimental effect on the functioning and quality of life in individuals with schizophrenia. The negative symptoms of schizophrenia, particularly anhedonia and avolition, may reflect a difficulty in representing the value of rewarding experiences in cognition and working memory. This review's goal was to assess the results of some genetic high risk (GHR) and family high risk (FHR) studies on the FDR of individuals with schizophrenia, which revealed that these individuals had significant or moderate neurocognitive abnormalities. Anhedonia in family members of people with schizophrenia.

Conclusions: It was found that relatives of schizophrenic patients are at high risk of developing physical anhedonia than normal population which may be used as a useful indicator of liability for schizophrenia among the relatives of affected population.

Keywords: Anhedonia ;Schizophrenia ;Relatives

INTRODUCTION

Schizophrenia is a persistent mental condition that affects a person's thinking, conduct, and ability to learn. Relatives of a patient with schizophrenia have a higher genetic burden. They are more likely to experience substance abuse, depression,

personality disorders, schizoaffective disorder, and schizophrenia [1].

The closer a relative is to the sufferer (first- or second-degree relative), the more likely they are to get schizophrenia. Psychopathology has an impact on the relative's general health. Personality traits may be linked to psychopathology. Psychopathology and personality can either have a causal involvement in one another's development or affect how one another presents or looks. One of the main risk factors for schizophrenia is having a first degree relative (FDR) who has the condition. The risk is 1% in the general population, but it rises to 10% if you have an FDR, such as a parent or sibling who has schizophrenia[2].

According to research, family members of people with schizophrenia are more likely than the general population to experience physical anhedonia. This finding could serve as a helpful predictor of the family members' susceptibility to schizophrenia. One biological vulnerability indicator of schizophrenia spectrum disorder is anhedonia. Anhedonia has a detrimental effect on the functioning and quality of life of those with schizophrenia. An inability to accurately express the importance of rewarding experiences in working memory and cognition may be the cause of the negative symptoms of schizophrenia, including avolition and anhedonia [3].

Examining the brain correlates of anhedonia in schizophrenia patients could reveal important information about the etiology of unpleasant symptoms. A degree of "disorganization" in the reward system as a result of impaired cognition and abnormal stimuli processing is reflected in the anhedonia phenotype in schizophrenia. The impairments of reward processing and neurocognition work in concert in schizophrenia. Hedonic abnormalities in reaction to enjoying rewards in the moment may not be the primary cause of anhedonia in schizophrenia, but rather neurocognitive difficulties in representing reward value [1].

Furthermore, a weakened capacity to create adaptive representations of expected value is associated with motivational deficiencies in schizophrenia. Conversely, decreased reward responsiveness is linked to depression-related deficiencies in effort expenditure. Compared to individuals with depression, those with schizophrenia seem to have unchanged reward liking from the standpoint of consummatory anhedonia [4].

Anhedonia among relatives of patients with Schizophrenia

Similar to "l'analgésie" The neologism "l'anhédonie" (the elimination of pleasure) was coined in 1896 by the French psychologist Théodule Ribot. He describes melancholia as the complete absence of pleasure, both mental and physical. Interest, emotional sensitivity, affective reaction, and loss of enjoyment are demonstrated in two case reports [5].

In his PhD thesis on grief and joy, French physician and psychologist Georges Dumas, who trained under Ribot, described similar anhedonic feelings. Dumas used the general phrase "moral anesthesia" rather than "anhedonia." Moral anesthesia did not survive, but anhedonia did. Anhedonia was embraced by American psychologist William James in his research on the different types of religious experience [6].

In addition to "passive joylessness and dreariness, discouragement, dejection, lack of taste and zest," "incapacity for joyous feeling," and "passive loss of appetite for all life's values," Anhedonia is one of the many forms of pathological depression, according to James. Abraham Myerson, a psychiatrist from the United States, spoke extensively about anhedonia at the American Psychiatric Association's annual meeting in 1922 [7].

Myerson adopted a more psychobiological approach while mentioning Ribot and James. According to his definition, anhedonia is a symptom complex that appears in a variety of mental diseases and psychoneuroses: "a dropping out from consciousness of desire and satisfaction," "a kind of organic anesthesia." In addition to these last two elements, Myerson also included the loss of energy and a sense of unreality. Additionally, he proposed a

pragmatic treatment strategy that includes restoring appetite, sleep, energy levels, and preventative measures [8].

The twentieth century saw a widespread decline in interest in anhedonia, in contrast to this early understanding. The earliest bibliometric search reference (the PubMed search for "depression and anhedonia"; the most current search was on December 5, 2018) was first found in 1959 [9].

Reward Circuits and Anhedonia in Schizophrenia

Neuronal reward circuitry and dopaminergic system dysregulation are linked to anhedonia in schizophrenia patients. According to earlier studies, A disruption in the cingulum bundle's microstructural integrity, which regulates the dorsal limbic system's integration, is linked to anhedonia in psychotic patients. Furthermore, trait anhedonia in schizophrenia patients is associated with fractional anisotropy values of the superior longitudinal fasciculus II, a significant frontoparietal white matter tract. Additionally, it has been shown that increased anhedonia in people with schizophrenia is linked to abnormalities in the fiber tracts that connect the rostral ACC to the medial OFC [10].

Similar to the functional coupling reported in patients with schizophrenia, healthy controls with social anhedonia demonstrate decreased FC between the right fusiform gyrus and the retrosplenial cortex, a component of the default mode network (DMN). Furthermore, in people who are clinically at high risk of psychosis, anhedonia exhibits a negative connection with the OFC's basal cerebral blood volume. Additionally, a study using positron emission tomography revealed a correlation between physical anhedonia and medial prefrontal default-mode hypoactivity in individuals with schizophrenia [11].

According to earlier research, the frontostriatal circuit, as well as the mesocortical and mesolimbic circuit systems, are dysregulated in individuals with schizophrenia, this leads to anhedonia. Increased anhedonia and depressed symptoms in schizophrenia patients are associated with decreased OFC and putamen/ventral striatum activity during reward anticipation[4].

Furthermore, task-related motivation, which is linked to the degree of anhedonia in patients with schizophrenia, is predicted by activity of the ACC and mPFC upon receiving an unexpected reward. It is believed that a diminished capacity to distinguish between signal gains and loss-avoidance episodes which are linked to the malfunction of the frontostriatal circuit, which comprises the vmPFC, dorsal ACC, anterior insula, and ventral striatum causes the motivational deficits of schizophrenia. Additionally, in patients with schizophrenia, anhedonia-asociality and posterior cingulate and precuneus activity two crucial DMN components show an inverse connection when doing an auditory oddball test. Patients with schizophrenia may also suffer from anhedonia as a result of poor reward network integration and striatal, brain, and limbic dysfunction [1].

Aversion Circuits and Anhedonia in Schizophrenia

In individuals with schizophrenia, aversion circuits are crucial in the emergence of anhedonia. Compared to healthy controls, In individuals with first-episode schizophrenia, deficiencies in emotion-behavior coupling for aversion-avoidance behavior are most noticeable. Furthermore, when given emotional face cues as part of a reward learning challenge, individuals with schizophrenia exhibit heightened aversion to furious faces [4].

Furthermore, negative feelings toward stimuli that others perceive as neutral or pleasurable are comparatively intense in people with schizophrenia. According to neuroimaging studies, people with schizophrenia have a bilateral habenula with a smaller gray matter volume and a stronger functional connection between the right habenula and subcortical regions such the caudate, putamen, and left ventral striatum that are connected to the dopaminergic reward pathways. The modulation of feedback-processing deficiencies in people with schizophrenia has also been

linked to aberrant habenula activity in response to unanticipated negative events. The ACC's activity in response to unpleasant imagery is negatively correlated with the severity of anhedonia and avolition symptoms, while schizophrenia patients' ventral limbic regions deactivate less in response to target events than aversive ones [12].

Furthermore, in female patients with schizophrenia, functional coupling of the striatal-amygdala network is negatively connected with oxytocin receptor-gene methylation and positively connected with the degree of anhedonia-asociality.Additionally, Schizophrenia patients exposed to unpleasant smells do not engage limbic regions, such as the parahippocampal gyrus, insula, and NAc; anomalies in these areas are linked to the neurological bases of anhedonia in individuals with schizophrenia [13].

Treatments for Anhedonia in Patients with Schizophrenia

Results from clinical studies show that individuals with schizophrenia respond less well to anhedonia therapies than those with depression. Although none of them have reached the threshold for clinically substantial improvement, atypical antipsychotics are more successful than conventional antipsychotics at reducing negative symptoms, like anhedonia, in schizophrenia [3].

Intermittent theta-burst stimulation over the dorsomedial PFC has also been shown to have no effect in improving anhedonia in people with schizophrenia. Consequently, present medications are ineffective in treating anhedonia in people with schizophrenia, underscoring the urgent need for more potent approaches. The malfunctioning of reward and aversion systems is closely linked to anhedonia, which is seen as a trait-marker of schizophrenia. Thus, understanding the neurological processes that underlie anhedonia could aid in determining possible avenues for schizophrenia treatment [1].

The increased risk in developing anhedonia in population at high risk like FDR of schizophrenic patients may highlight the critical need for early detection and targeted management of anhedonia in high-risk populations. Enhanced educational and psychological support for relatives could improve their well-being and positively influence the clinical outcomes of the patients they care for.

Further studies are recommended to refine interventions aimed at relief the burden of psychiatric illnesses on families. It also highlights the critical need for clinicians to incorporate caregiver assessments into psychiatric care plans. By identifying caregivers at risk of psychological distress, healthcare providers may implement targeted interventions that benefit both caregivers and patients.It may also advocate for the integration of family-centered approaches in mental health policy and practice. Specifically, the study calls for structured programs that address caregiver needs, including stress management, counseling, and educational resources.

CONCLUSIONS

According to research, family members of people with schizophrenia are more likely than the general population to experience physical anhedonia. This finding could serve as a helpful predictor of the family members' susceptibility to schizophrenia. Future studies should continue exploring the interplay between genetic predispositions,caregiving stress, and social support, aiming to develop evidence-based strategies that alleviate caregiver burden and foster long-term well-being.

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