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Letter to Editor

Treatment of Schizophrenia Using Lithium Chloride, a Ketogenic Diet, and Stem Cell Transplantation

Dear Editor

Schizophrenia, a serious mental disorder, affects 1% to 2% of people globally and has a substantial financial impact on health and social services. The illness is influenced by both environmental and hereditary variables. Symptoms of schizophrenia include delusions, hallucinations, confused thoughts, diminished emotional responses, social withdrawal, and anhedonia. Additionally, the brains of individuals with schizophrenia exhibit changes in neurogenesis, neuronal maturation, neuronal connectivity, and synaptic impairment as well as mitochondrial dysfunction.[1] Both mood disorders and schizophrenia were found to be characterized by rather consistent changes in glutamatergic and GABAergic neurotransmission.[2] In addition, individuals with schizophrenia have dramatically lower levels of membrane phosphatidylcholines and phosphatidylethanolamines, especially the plasmalogen. Furthermore, there is a noticeable drop in the overall amount of polyunsaturated fatty acids in the membrane of people with schizophrenia, which lowers the fluidity of the membrane. Both the number of peripheral lipid peroxides and the accumulation of membrane-oxidized lipids rise, and the activated phospholipid remodeling brought on by excessive oxidative stress in schizophrenia is related to the compromised membrane lipid homeostasis mechanism.[3] However, patients who have been treated with antipsychotic drugs are at a high risk of developing hyperprolactinemia, which leads to decreased bone mineral density, osteoporosis, menstrual disruption, infertility, breast cancer, and cardiovascular problems.[4] Nonetheless, lithium is not among the medicines that cause prolonged elevation of plasma prolactin;[5] consequently, it can be used for the treatment of schizophrenia. Low-dose of lithium (250 mg per day), with atypical antipsychotic treatment, has improved cognitive impairment in drug-naive patients with first schizophrenia symptoms.[6] Thus, both lithium and the ketogenic diet are beneficial in treating schizophrenia. They change the GABA and glutamate ratio in favor of GABA by inhibiting catabolism and enhancing the synthesis of GABA as well as glutamate metabolism. This could help to compensate for these disrupted GABA levels in the brains of individuals with schizophrenia. The ketogenic diet is a nutritional therapy rich in fat, sufficient in protein, and low in carbohydrates, forcing the body to burn fats rather than carbohydrates.[7] Lithium Chloride (LiCl) has a profound impact on human well-being susceptibility to a variety of diseases, such as mood disorders, neurodegenerative diseases, cancer, and stem cell growth kinetic.[8] Furthermore, the chronic administration of lithium chloride significantly improved trimethyltin-induced cell death in the entorhinal cortex of rat brains.[9] The recommended dietary allowance for a 70 Kg adult is 1 mg/day. It can be found in vegetables, cereals, and supplemented drinking water sources.[10] Stem cells are seen to be a potential treatment for mental illnesses such as schizophrenia disorders. When lithium is used in stem cell treatment, it can boost both self-renewal and migration rates.[11] Today, there is a lot of promise for alternative therapies in the future thanks to mesenchyme stem cells and induced pluripotent stem cells (iPSC), which can be used for autologous cell transplantations without running the risk of immunological rejection. Gene reprogramming can also be used to derive iPSC directly from adult cells. In regenerative medicine, mesenchymal stem cells have generated a lot of interest due to their plasticity, and immunomodulatory and anti-inflammatory properties. They are high-yield cells that can be obtained non-invasively from adult tissues. In addition, they are non-tumorigenic and the most extensively investigated techniques.[12] Tefillin found that transplanting intracerebroventricular mesenchymal stem cells derived from bone marrow can ameliorate the behavioral and phenotype model of schizophrenia. It was accomplished by increasing hippocampi with enhanced neurogenesis in the brain mice model of schizophrenia.[13] A previous study

demonstrated that intranasal administration of mesenchymal stem cell-derived extracellular (MSC-EVs) vesicles improved behavioral and biochemical deficits in a phencyclidine (PCP) model of schizophrenia, and that the EVs preserve the number of parvalbumin-positive GABAergic interneurons in the prefrontal cortex (PFC) of treated mice. The cerebrospinal fluid (CSF) of mice treated with PCP had lower glutamate levels by MSCs-EVs.[14]

In conclusion, the intake of lithium chloride, a ketogenic diet, and stem cell transplantation could help to stimulate neurogenesis, making it a potentially effective therapeutic option for people suffering from schizophrenia disorder.

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Authors' Contribution

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