

Effectiveness of Neuropharmacology in Dealing with Drugs to Correct Imbalances in the Body's Functioning Via Neural Control

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Abstract

Neuropharmacology assists in understanding the drug action in the brain that integrates knowledge of drug molecular and cellular action with their effect on the brain circuitry. This factor helps to understand the clinical activity of the drugs on the brain that create neuroplasticity and indicates the long-term adoption of neurons to the sustained short-term action of the drugs. Modern neuropharmacology provides the advantage of utilizing tools of molecular biology, genetics, and cell biology and also includes combination chemistry for generating noble molecules for understanding the practical function of the new drugs. This new drug helps the patient to regulate their neurotransmitters for controlling the imbalance of their body functioning and develop their quality of living positively. Identification of multi-receptor subtypes of neurotransmitters helps to recognize the complex projector signal transduction cascades for producing their biological responses. This factor helps to evaluate the effects of drugs with liquid chromatography and mass spectrometer for revealing the presence of chemical compounds' effect on the body.

The study applies secondary resources from medical journals and articles to collect more knowledge about the effect of neuropharmacology in developing an imbalance of body function with the help of neural control. This factor helps to provide knowledge about the signaling pathways for activating the ionic channels in the computation models of Glutamatergic.

Keywords

Neuropharmacology, Neurotransmitters, Neuroplasticity, Drug, Molecular Biology.

INTRODUCTION

Neuropharmacology is defined as the study of collecting knowledge about the effectiveness of drugs on the nervous system for developing the compound therapeutic process for benefiting patients with psychiatric and neurological diseases. This factor has to correct various imbalances in the body functions by controlling neural systems such as somatic, sympathetic, and parasympathetic nerves effectively. Neurological disorder creates an impact on the brain, spinal code, and neuromuscular function or peripheral nerve by affecting the central nervous system that leads to an imbalance in the body's functioning [1]. This disorder includes stroke, epilepsy, Alzheimer's disease, depression, psychosis anxiety, post-traumatic stress disorder, and Parkinson's and Huntington's Disease. The application of drugs helps to block the naturally occurring chemical or organ response in the neurology-related treatment procedure. This factor can lead to skeletal muscle inhibition, development of cardiac input, alteration of the vascular tone, and modified function of the central nervous system in the patient's body.

The imbalance in neurotransmitters causes them to face difficulty in regulating appetite, temperature, and mood abnormalities in maintaining body function effectively. The neuropharmacological agent's working process depends on the number of receptors for improving the selectivity,

receptor affinity, and effectiveness of the patient's body. For the past three decades, India has shown a high disease burden of specific diseases including store headed person disease and dimension that is reported in the urban Indian population. 10 to 12 million people are suffering from epilepsy in India that is a part of a non-communicable neurological disorder that affects the health condition of individuals. The development of antiepileptic drug therapy helps patients control their seizures and can lead to problems such as drug toxicity and drug-drug interactions. More than 4 million people are suffering from Alzheimer's disease in India that affected their lifestyle negatively [2]. Effective implementation of neuropharmacology assists the therapist to understand the impact of neurotransmitters in the memory process, synaptic transmission, neuronal growth, differentiation inhibitors balance, and neuromotor control in the body.

This factor helps to control the chemical imbalance with the help of medication to develop the presentation efficiency across the blood-brain barriers for developing the balancing process of body functioning [3]. The objective of this study is to highlight the effectiveness of neuropharmacology in establishing balance in the body functioning process of the individual with the help of neural control. This study is a brief discussion of neurological disease and the impact of neuropharmacology in improving neural control to maintain body functions.

LITERATURE REVIEW

Significance of neuropharmacology

The neuropharmacological effect helps to deal with the influence of drugs on the nervous system that causes mood changes and affects the behavioural actions of individuals. These drugs work as chemical substances that help to establish communication with neurons and create different impacts on the nervous system. Neuropharmacology includes sedatives and analgesics as pharmacodynamics agents, antidepressants, and hypnotic drugs for the central nervous system, sulphonamides, and antimicrobials for chemotherapeutic action, and also supplementary agents such as vitamins and supplements [4]. The chemical structure develops effects on both pharmacodynamics and pharmacokinetics elements of neuropharmacological drugs that belong to subclass 8. The neurons in the brain establish communication with each other through chemical and electrical signals and develop tiny gaps as synapses for the pre and postsynaptic neurons' arrival and exchange process of chemicals. The drug helps to evaluate liquid chromatography (LS) and mass spectrometer (MS) for the identification of chemical characteristics and helps to reveal the presence of compounds chlorogenic acid, germacranolides, and acacetin in the body.

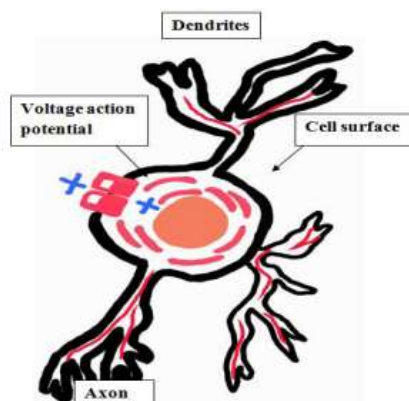


Figure 1. Schematic diagram of neurons
(Source: [5])

The utilisation of XPPAUT software helps to compute the effect of drugs on the pathological neural mechanism and monitor the effect on the neurons and their excitability in activating the signalling pathway. Neuropharmacological drugs help to produce neurotransmitters to produce a chemical signal with the help of a signal transduction pathway for targeting cells at the synaptic cleft for producing therapeutic action in the drug's administration [6]. On the other hand, it can be seen that some drugs have a neuroprotective effect and others have a neurodegenerative effect on the neuron system of the individuals. The emerging technique of genomics and proteomics promote the progress in neuroactive drugs in the nerve cell for developing the activity of electrophysiology effectively. The neuropharmacological effect helps to cure the medical state due to its antidiarrheal, anti-inflammatory, and antibacterial

activity that creates positive effects on the individuals' health condition.

Signalling pathways with the help of computational models

Neuropharmacological drugs affected the brain by stimulating the activities with the help of modulated influence on the cellular signalling pathways for the activity of the synaptic input. This factor highlights the intracellular molecules with the help of the cascade pathway for the activating of the ionic channels with the help of computational modules. The implementation of computation and model helps to understand the biochemical reaction in monitoring the prognosis of the drugs according to the changes of cyclic AMP, secondary level messenger, and modulation of downstream phosphoproteins [7]. The implementation of the XPPAUT software assists to resolve the issues related to biochemical kinetic reactions and modifies the computation model in signal in molecules in synaptic plasticity for projection of spiny medium. This factor helps to project the spinal neurons' environment in the dopaminergic and glutamatergic activation signals pathway that helps to generate cAMP cyclic adenosine monophosphate effectively.

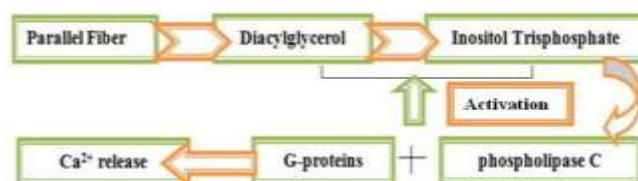


Figure 2. Glutamatergic Signalling pathway
(Source: [8])

The above figure shows that the “glutamate pathway” helps to stimulate glutamate for evaluating calcium levels in the following process that is shown in the above figure. Glutamate act as the predominate accelerated transmitter in the central nervous system for increasing the number of glutamate synapses and enhancing the glutamate synaptic function efficiently. This factor assists in the excitability of brain circuits in extending resistance imposed with the help of an inhibitory mechanism during the occurrence of a seizure. It has been seen that 80% of glutamate is used as a transmitter of CNS neurons for synthesis from glutamine with the help of phosphate-activated glutaminase [9]. The release of cytoplasmic glutamate guides the usage of the specific vesicular transporter in the transportation process through synaptic vesicles. The synaptic terminals help this pathway to the completely separate population of glutamate and non-glutamate vesicles in developing the ability to release glutamate from epileptic human tissue with their predominant transmitter.

Effect of drugs on the nervous system

Neuropharmacological drugs help to offer therapeutic benefits in managing the control balance in body functioning with the help of “*Nigella sativa*” that acts as an

anticonvulsant and antidepressant property. This drug is composed of essential biomolecular materials such as carbohydrates, protein, fibre, and multiple vitamins and Minerals that contain carotene for the conversion process of vitamin A in the development process. This factor helps to activate the compound "thymoquinone" for developing the release of acetylcholinesterase enzymes and reducing neural disease among individuals [10]. GABA and nitrite modulations access to control anxiety and depression for enhancing the level of children in the brain and improving the memory and learning experience of the patients. The "Euphorbia pulcherrima (EP)" guides to the reduction of central and peripheral pain with the help of peritoneal injection and activating nociceptors for reducing the inflammatory action site pain. Moreover, "Calotropis gigantea" assists in the development of the reaction of thiopental drug in the Gaba receptors in neuro modulation for entering the process of chloride ions in the open channel, the longer process for regulating glutamic activity.

system. Regular usage of nicotine increases the level of dopamine in the individual's body and creates a permanent change in the cholinergic receptors of the brain. The usage of cocaine influences mood level alertness and sense of energy that can cause the loss of appetite and reduce fatigue and includes coma, Seizures, and delirium. The stimulation of caffeine helps to block the inhibition of neurotransmitter "adenosine" receptors in releasing neurotransmitters as the amino acid glutamate for stimulating CNS activity [12]. The chlorogenic acid creates an antinociceptive effect, acacetin leads to depressant activity and rutin causes antinociceptive and antidepressant activity.

Neuropharmacology treatment procedure

Neuropharmacological treatment assists to get positive results on the nervous system and helps to cure neurodegenerative disorders effectively that utilize as the rehabilitation tool in the treatment procedure. Metformin is used for the treatment procedure of stroke for its therapeutic effect on neuro disorder and reduces the severity of the stroke and also activates AMP-activated protein kinases (AMPK) in fuel sensing of enzymes. This factor had to regular the homeostasis and a cellular sensor for elevating the level of AMP in the conformation changes in the exposes binding sites of metformin. This drug helps to apply multiple downstream mechanisms of AMPK activation to protect against cerebral ischemia with the help of the antioxidant pathway to suppress post-ischemia neuroinflammation [13]. This factor helps to contribute to promoting the effects of metaphor pin on poststroke brain repairing including angiogenesis for perfusion in AMPK-activation-dependent mechanisms. This medication helps to display a therapeutic effect on sensorimotor recovery and cognitive deficits and anxiety symptoms in the patient's body and resolve the health issues efficiently.

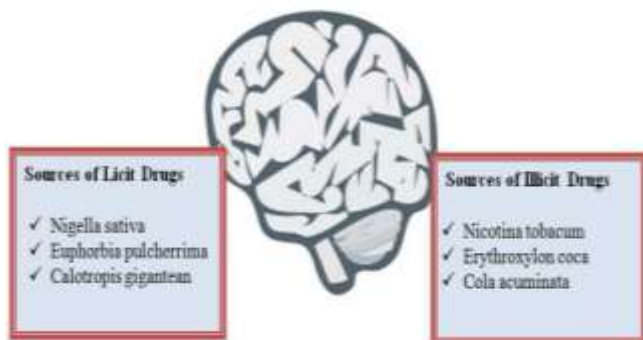


Figure 3. Source of plants containing drugs
(Source: [11])

The illicit drugs create a negative impact on the human base that shows an introduction to the neurochemical activities of the brain and involve interaction with the brain

Problem	Treatment
Depression	Tricyclics, serotonin reuptake inhibitors, diazepam, ativan
Dementia	Rivastigmine, donepezil, tacrine, galantamine
cognitive deficits	Levodopa
Psychosis	Clozapine, quetiapine, olanzapine, risperidone, rivastigmine, tacrine, galantamine

Figure 4. Neuropharmacological treatment of neurological issues
(Source: [14])

Levodopa assists in regulating cholinergic and catecholaminergic function in maintaining mood, cognitive and psychiatric changes in the treatment process of Parkinson's syndrome. The utilization of rivastigmine, donepezil, and galantamine drugs in the treatment procedure of dementia helps to control the level of dopamine and serotonin for reducing anxiety and depression among the patients. The "verpamil" drugs guide the peripheral region in the brain for dissolving disorders related to the vestibular system that involves synapse along with the neurons releasing glutamate and aspartate neurotransmitters.

Carbamazepine is a drug to treat epilepsy and nerve pain by providing stability with the help of electrical activity in the brain and the nerves [15]. "Clozapine and quetiapine" drugs reduce dopamine activity and reduce the symptom of hallucination and develop recognition memory with the help of neurotrophic-related signal molecules. These drugs help to develop the functioning process of the brain with the regulation of the neurotransmitter and the development of the signalling pathways in the treatment process of neurological disease.

METHODOLOGY

Study design

In the study, the cross-sectional study design is utilized for investigating the influence of neuro pharmacotherapy in the neurological disorder treatment process and analysing its effects on the patients. This factor has to measure the mental health outcome in developing the body functioning with the help of neurotransmitters and describe their sign and symptoms in healthcare procedures of the individual patients. This study design allows for the identification of the representative of the treatment procedure for the neurological disorder that affects patients and enhances the mental health of individuals effectively. This factor guides the measure of psychological development in the healthcare service and promotes awareness about examining the signalling process of neuropharmacological treatment [16]. The development of neuropharmacology drugs helps the patient to develop muscle activity with the help of regulating neurotransmitters among individuals. This cross-sectional study also helps to evaluate the different drugs' effects on the different types of neurological disorders and helps to develop knowledge about the pros and cons of the drugs.

Data sources

The secondary qualitative data is used in this research for gathering data related to neuropharmacology in dealing with drugs to correct imbalances in the body's functioning. Online resources such as journals and articles from Google scholar and medical articles assist to examine the different types of neuropharmacology treatment and their impact on the regulation of the neurotransmitter. The gathering of data related to neurological disorder treatment guides the understanding of the influence of therapists in the clinical treatment procedure. This factor also leads to identifying the root causes of neurological imbalances among individual patients and examining their clinical reports for further treatment procedures [17]. The effective data collection process assists to get accurate data about the medication and doses of pharmacotherapy in neurological treatment and its impact on the neurotransmitters in the patients.

This factor helps to recognize the characteristic of neurological disorders by the guidance of the case history of the individual patient and measuring the signs and symptoms of the individual. The secondary data related to neuropharmacology treatment among the patient's guides to implement the clinical treatment procedure and getting recommendations from the therapist for enhancing the treatment procedure.

Data analysis

The secondary data analysis guides the development of the sorting process that is utilized in this study of neuro pharmacotherapy in neurological treatment for developing the body functioning process. This factor helps to indicate the positive and negative aspects of pharmacotherapy on the patient's body with the help of neural control and analyse the

risk effectively. The analysis of the risk related to pharmacotherapy allows the therapist to recommend effective medicine for the patient according to the clinical analysis of the patient's record [18]. This factor helps to understand the effect of the medicine on the patient's mental health and develop the quality of health care services for individuals. The secondary data analysis provides effective strategies for developing communication with synapses for understanding the influences of neurotransmitters and their relation with the neurological disorder. This factor guides the understanding of the pattern of the signalling pathway of neuropharmacological treatment and constructs the treatment procedure as per the clinical analysis.

FINDINGS AND DISCUSSION

Significate of neuropharmacology in the treatment process

The branch of neuropharmacology mainly deals with medicines that can impact negatively the nervous system of individuals. The specific field of neuropharmacology required some depth of knowledge in evaluating the process of functioning of those drugs on the nervous system. After applying for those medicines, it is required to observe the alternation of behaviour of individuals due to activities on the neural circuits. In the primary phase, there were few drugs obtained in neuropharmacology such as morphine, caffeine, nitrous oxide, and aspirin. However, nowadays, pharmacological fields have introduced a set of new medicines such as opioids and barbiturates. In that case, modern pharmacological field and drug development systems have been paying attention to the molecular level, therefore scientists can measure the variation in genetic level within the individuals after applying drugs [19]. The influential factors in neuropharmacology can be regulated with the help of various nerves present in the brain, in this way, this approach can correct the imbalance activities of the body by establishing proper control of the nervous system.

Previous information helps to evaluate that, the human nervous system is one of the complicated systems and is mainly composed of various parts such as the spinal cord, brain, central nervous system, peripheral nervous system, and also parasympathetic nerves. Most of cases, nerve impulses can be easily activated or deactivated with the help of the actions of neurotransmitters at the junction of neural cell effector. After the consumption of drugs, the immediate action can be noticed on the synapses, that only permits a few receptors to start their action on some organs. The impact of neurological disorders can be further observed on the areas of different body parts and as a result, the body cannot function properly [20]. Neurological disorders incorporate some other diseases such as anxiety, depression, stroke, Parkinson's, and stress-related disease. From the aforementioned part of the study, it can be noticed that there are near about 10-12 million individuals who have been affected by a severe disease named epilepsy. The therapeutic approach also includes the

application of antiepileptic medicines to cure those affected individuals. It is required to control the imbalance of chemical substances to promote the efficiency of medicines for the proper function of the body.

Drugs working process on the neurotransmitters

The impact of neuropharmacology has successfully covered the area of the activities of the nervous system after the application of drugs. In that case, those drugs can be denoted as messengers or communicators among those neurons. The impact of those drugs significantly affects the central nervous system [21]. The study provided a clear illustration on various factors such as pharmacodynamics, hypotonic drugs and sedatives. Long term exposure of neuropharmacological drugs can influence the stimulation of brains through some signalling pathways. The role of cascade pathway is mainly responsible for the activation of the ionic channels. Therefore, the digitalization process has already proved the effectiveness of computational modules on the drug development process. Biochemical reactions can be observed in a detailed way after the implementation of those computational models in the field of neuropharmacology. In that case, the utilization of XPPAUT software can aid the process of kinetic reaction and alternation in the computational process [22]. As a result, a signal can be produced by the cyclic AMP sites and the activation of cAMP has been conducted through the activities of dopaminergic and glutamatergic substances. Communication can be observed among the different parts of the brain of individuals after developing small gaps at the region of synapses. From those little gaps electric signals can be discharged and propagate among the nerve cells within the brain. The role of liquid chromatography and mass spectrometer has been measured effectively to evaluate the presence of acetin and chlorogenic acid in the body.

Analysis of the Neuropharmacology treatment procedure

Consumption of drugs should be accomplished after consulting with healthcare practitioners properly. Drugs should be recommended in a low dosage form in the initial phase, and it can steady the working process of the heart, brain, and other parts of the body. In that case, Dopamine can be considered as one of the essential substances which can regulate the mood swings and behaviour of patients. In that case, marijuana or other types of opioid drugs can directly hamper the activities of dopamine. On the other hand, Serotonin can be taken as another neurotransmitter that can regulate moods and also stabilize the emotions of individuals, in order to address the stress related issues GABA can be taken as one of the best neural tranquillizers, that helps the central nervous system to steady the entire process. In that case, the drug benzodiazepine can deliberately impact on the lowering capability of GABA [23]. Another hormone called Norepinephrine plays an essential role in delivering a quick response of CNS toward any activity. After the usage of ecstasy and opioid drugs, the level of norepinephrine has

been reduced.

Advancement in the neuropharmacological sector can bring lots of benefits in the control process of the body on different actions. In that case, the effectiveness of *Nigella Sativa* can be beneficial for those patients who have been suffering from nervous issues. This *Nigella* has antidepressant properties along with vitamins, proteins, carbohydrates, and minerals. Another property named "Thymoquinone" can be developed by the reaction of essential materials, hence the neural stress among those patients can be reduced after the release of acetylcholinesterase enzyme [24]. From the previously mentioned literature, it can be observed that depression-related issues can be treated with the drugs such as serotonin, Ativan, and diazepam. Another disease, dementia, can be treated with some other medicines such as donepezil, galantamine, and Rivastigmine. In this way, treatment conducted with the help of neuropharmacological processes can impact positively the nervous system of patients and also aid in the curing process. Some patients may develop cognitive issues or defects, in that case healthcare practitioners should suggest Levodopa drug for the betterment of those patients [25]. In the case of treating psychosis, the neuropharmacology department has developed drugs such as, clozapine, risperidone, galantamine, and quetiapine.

DISCUSSION

Neuro pharmaceutical drugs have physicochemical parameters such as lipophilicity, solubility, ionization, constant, surface activity, and pH level. This factor helps to produce physiological changes in the patient's body and perform vital functions such as antidepressants, anticonvulsants, analgesics, anxiolytics, and memory enhancers for developing the body's functioning process. Neuropharmacological treatment helps to regulate the neurotransmitter with the help of medication in managing the behaviour of the patients and resolving the neurological disorder [26]. In the treatment procedure of stroke, the observation of the cerebral with the help of a laser doppler flow meter in the lab with the help of magnetic resonance imaging (MRI) in the clinical process. This factor guides in evaluating the severity of the stroke attack and its impact on the neurotransmitters. The development of neuropharmacological drugs helps to reduce the number of seizure attacks and elevate the mental condition of the patients.

The application of antidepressants and vestibular sedatives that helps to apply computation models for developing the neurotransmitter signalling pathways. This factor helps to lower the capacity of GABA in regulating the neurotransmitters such as dopamine histamine and oxytocin and also participates in developing synapses activity in the brain. The regulation process of neurotransmitters helps healthcare providers to prescribe effective medicine according to the signs and symptoms of neurological

disorders and develop their health condition effectively [27]. The influence of licit drugs helps to reduce the inflammation action in the neurotransmitter and radius the pain effectively and also regulates the glutamate activity with the help of open channels. The characterization and identification of targets help to confirm the fundamental problem of neuroscience and medical chemistry that helps to promote genomics and proteomics for developing new reactive drugs on the nerve cell and developing electrophysiological effects. This factor helps to reduce the guest to track your pain with the help of neuropharmacological drugs in reducing the effect of pain with the help of regulating neurotransmitters [28]. “Levodopa”, “Metformin” and “Rivastigmine” are mostly used in regulating the function of the neurotransmitter and resolving the neurological disorder effectively.

CONCLUSION

From the above discussion, it can be concluded that neuropharmacology develops the impact of chemical structure with the pharmacodynamics and pharmacokinetic element on the neurons in the brain. The XPPAUT software assists to identify and characterize the potential pharmacological targets in the neurons and the psychiatry effect on the patient's body. This factor includes voltage-dependent ion channels such as sodium and potassium, synaptic receptor channels such as glutamatergic and GABAergic, and G protein signaling Pathways such as protein kinases and other enzymatic cascades. This factor helps to provide a review of the neuro molecular drug stimulation process and predict the effect of chemical agonists, antagonists, and modulators in the nervous system. The stimulation process of drugs helps to maintain the neuro-modulation process in the open channels for developing the process of regulating glutamic activity in the neurotransmitters. Treatment procedures utilizes tricyclics, rivastigmine, levodopa, and quetiapine resolving the influence of psychosis disorders such as depression, dementia, and psychosis effectively. The efficiency of drugs helps to develop communication among the different parts of the individual's brain after enhancing the small gaps in the synapse for maintaining the regulation of neurotransmitters.

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