



NETWORK PHARMACOLOGICAL ANALYSIS OF CANNABIS SATIVA L. PHYTOCONSTITUENTS IN DEPRESSION MANAGEMENT

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1. Abstract

A not unusual and big mental health problem affecting more than 280 million people globally, despair is Socio-monetary pressure, genetic predispositions, and environmental elements all influence its growing prevalence. Though they have dangers such not on time onset, terrible facet effects (e.G., sexual disorder, weight gain), and ineffectiveness in 30–50% of sufferers, fashionable remedies are selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs). These shortcomings draw attention to the requirement for opportunity healing procedures.

Natural substances, specially those from Cannabis sativa, have attracted first rate hobby for their capacity antidepressant residences. Among them, cannabidiol (CBD), a non-psychoactive cannabino, has established anxiolytic and antidepressant outcomes by way of numerous mechanisms along with modulation of serotonin receptors (five-HT1A), dopamine pathways, and the endocannabinoid gadget. Unlike THC, which could set off anxiety at high doses, CBD has an excellent safety profile, therefore being a likely healing candidate.

Network pharmacology (NP) is changing how plant-primarily based chemical compounds are studied with the aid of imparting insights into complex drug-target interactions. By approach of bioinformatics, omics records (genomics, proteomics), and systems biology incorporated, NP maps drug-disorder connections and helps locate multi-target remedies. This method is mainly useful for understanding the polypharmacology of Cannabis sativa, together with its outcomes on neuroinflammation, neurogenesis (via BDNF modulation), and hypothalamic-pituitary-adrenal (HPA) axis control.

This explores:

1. The neurobiological mechanisms of despair, such as monoamine deficiency, neuroinflammation, and HPA axis dysregulation.

2. The disadvantages of traditional antidepressants and the want for alternative answers.

Three. The pharmacological profile of Cannabis sativa, stressing CBD's function in mood manipulate.

Four. Regulatory concerns, in particular in India, where underneath the NDPS Act despite kingdom-level exemptions hashish research is restricted below the NDPS Act.

Network pharmacology is advancing drug discovery, repurposing, and validation of herbal antidepressants.

Future guidelines underline the significance of medical trials, coverage reform, and AI-pushed NP fashions in bridging the gap among cutting-edge pharmacology and conventional plant-primarily based medicine.

2. Introduction

Depression is a multifarious psychiatric sickness past most effective chronic sadness. It affects intellectual overall performance, emotional balance, and popular nicely being. The World Health Organisation (WHO) ranks unhappiness as a considerable supply of handicap given economic charges exceeding \$1 trillion annually. Despite treatment advances, treatment-resistant despair (TRD) stays a large problem for nearly one-third of patients, therefore stressing the demand for progressive therapeutic tactics.

•Challenges with Conventional Antidepressants:

First-line pharmacotherapies are SSRIs (e.G., fluoxetine, sertraline) and SNRIs (e.G., venlafaxine, duloxetine), usually aimed toward monoamine neurotransmitters. On the alternative hand, these drugs have super downsides:

Delayed healing consequences require 2–6 weeks of apparent development.

Negative facet outcomes are weight advantage, emotional blunting, and sexual dysfunction.

Limited efficacy calls for greater remedies such ketamine and electroconvulsive remedy, that have their very own risks (e.G., cognitive impairment, dissociation).

Given those obstacles, hobby in plant-derived replacements—mainly cannabinoids from *Cannabis sativa*, that have been utilized in conventional remedy for hundreds of years—is growing.

The Potential of Cannabis sativa in Depression Management

Over one hundred bioactive cannabinoids make up cannabis; THC and CBD are the maximum studied. Research suggests that CBD has tremendous antidepressant impact with the aid of: Activating 5-HT_{1A} receptors, therefore enhancing serotonin neurotransmission.

Increase anandamide ranges, an endocannabinoid related to mood stabilisation.

Reducing neuroinflammation is aided through suppressing pro-inflammatory cytokiens—e.G., TNF- α , IL-6.

Increase strain resistance via controlling the HPA axis.

Though promising, hashish pharmacology is difficult considering its outcomes rely upon dosage and interactions with CB₁ and CB₂ receptors. Dealing with this complexity calls for superior computational tools such as community pharmacology.

Network Pharmacology: A Holistic Approach to Drug Discovery:

Traditional drug improvement may not be sufficient for treating multifactorial illnesses like despair since it follows a "one-drug-one-target" philosophy. Network pharmacology (NP) allows one to method extra holistically through: Mapping polypharmacological interactions, inclusive of CBD's effect on BDNF, serotonin transporters (SLC6A4), and inflammatory pathways.

Looking for drug repurposing opportunities where chemical compounds with known anti inflammatory residences should have antidepressant consequences.

Finding new biomarkers for individualised remedy using omics-primarily based expertise.

Though states like Uttarakhand have legalised managed hemp developing, cannabis studies in India is concern to extreme NDPS Act (1985) obstacles. NP may want to answer questions and help to lessen reliance on massive clinical research by using allowing digital screening and in silico modelling.

Objectives of This Review

Establish the neurobiological basis of unhappiness and the boundaries of gift treatments.

Consider *Cannabis sativa*'s pharmacological potential as an antidepressant.

Look at how network pharmacology could help to maximise plant-based drug discovery.

Look at criminal questions and offer solutions to encourage cannabis research.

By combining contemporary computational biology with conventional ethnopharmacology, this paper advocates for translational research that could show *Cannabis sativa* as a scientifically established, multi-goal antidepressant.

Key Features of This Review

Main Aspects of This Review India-specific regulatory insights, such as NDPS Act regulations and evolving country-degree regulations.

A contrast of CBD and THC in the treatment of depression.

Creative NP employs tailored to plant-based totally remedy discovery.

Future points of view combining policy worries, technological advances, and clinical research.

Conclusion

The destiny of despair treatment can be multi-target therapeutics; Cannabis sativa, with its one of a kind pharmacological profile, gives exquisite promise. Network pharmacology, artificial intelligence-pushed drug discovery, and innovative coverage reforms will help us to bridge the gap among nature and cutting-edge neuroscience, so opening the path for complete and effective mental health solutions.

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