Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(2), 1514-1519 | ISSN:2251-6727

Exploring Traditional Wisdom: Antipsychotic Properties of Ethano Medicinal Plants in the Cucurbitaceae Family

Trayambica Acharya[1], Rupali Rupasmita Rout[1], Satish Kanhar[1], Diptimayee Jena[1], Kirtimaya Mishra[1], Ashirbad Nanda[1*]

1,1*School of Pharmacy and Life Sciences, Centurion University of Technology and Management, Bhubaneswar-752050, Odisha, India

(Received: 07 January 2024 Revised: 12 February 2024 Accepted: 06 March 2024)

KEYWORDS

Psychosis, Schizophrenia, Dopamine, Anti depressant, Mucuna pruriens, Levodopa

ABSTRACT:

Psychosis is a frequent and severely handicapping symptom of many psychiatric, neurodevelopmental, neurologic, and medical diseases. Schizophrenia is a mental illness that results in abnormal behaviours, decreased affect, and altered thought and perception. The neurotransmitter most closely linked to the pathogenesis of psychotic illnesses is dopamine. Dopamine overproduction in the mesolimbic tract is thought to be the main factor of the positive symptoms of psychotic disorders. Additionally involved is glutamate, an excitatory neurotransmitter. The leguminous plant Mucuna pruriens (MP), which thrives in all tropical regions and contains levodopa, was looked into as a possible levodopa substitution for Parkinson's disease sufferers. Polyphenols found in herbal drugs contribute to this regulation of depression. Clinical studies suggest that proinflammatory cytokines, those are available in polyphenols, may contribute to the pathophysiology of depression. According to a phytochemical examination of numerous secondary metabolites, phytocomponents include anthraquinone, flavonoids, steroids, tannins, saponins, alkaloids, terpenoids, and cardiac glycosides are present.

1. Introduction

A common and severely debilitating symptom is psychiatric, neurodevelopmental, neurologic, and medical conditions, psychosis is also a crucial area for investigation and treatment in neurologic and psychiatric practice [1]. A mental condition called schizophrenia causes behavioural disturbances, diminished affect, and abnormalities in thought and perception. It is characterized by the availability of negative symptoms, like hallucinations, delusions, and disordered speech and behaviour [2]. During a psychotic episode, a person may also have delusions. The most common sorts of delusions are as follows: Reliable Source: Erotomanic delusions: the conviction that, someone else is having love with them [3]. Postpartum psychosis is a mental emergency that could seriously harm mothers', infants', and families' health and well-being. Mania or a mixed-mood episode a sign of PPP, but severe confusion, depression, and anxiety are also frequent [4]. The neurotransmitter dopamine is most firmly inextricably bound up with the pathophysiology of psychotic diseases. Positive symptoms of psychotic diseases are hypothesised to be caused by an excess of dopamine in the mesolimbic tract. Excitatory neurotransmitter glutamate is also involved. Several investigations have discovered a reduction in the N-methyl-D-aspartate (NMDA) glutamate receptor activity, which is the primary contributor to psychosis [5].

2. Herbal Approach for Mitigation of Psychosis

Levodopa-containing leguminous plant Mucuna pruriens (MP), which grows in all tropical climates, was investigated as a potential substitute for levodopa for people with Parkinson's disease. Mucuna pruriens has DDCI-like substances which is utilized in therapy of Parkinson's disease [6].

Ma Huang has only ever being linked to one case of mania, whereas ephedrine has being connected with cases of psychosis. Researchers observed how clozapine and herbal medications including Fructus Schisandrae, Radix Rehmanniae, Radix Bupleuri, and Fructus Gardeniae are interacting with one another in schizophrenia patients.

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(2), 1514-1519 | ISSN:2251-6727

Rhodiola rosea (roseroot) and Crocus sativus (saffron) for depression; Passiflora incarnata (passionflower), Scutellaria lateriflora (scullcap) and Zizyphus jujuba (sour date) for anxiety disorders; and Piper methysticum (kava) for phobic, panic and obsessive-compulsive disorder [7]. Crocus sativus (Saffron) has been utilized to heal depression, with four RCTs currently existing supporting this use. Rhodiola rosea, an adaptogen with stimulating and possibly antidepressant properties, represents one of the most promising plant remedies for depression [8].

Lavandula angustifolia's antidepressant effectiveness has been examined which has a lengthy history of usage in the intervention of nervous system problems [9].

The principal psychoactive action of cannabis, the most widely used illicit substance, is caused by delta-9-tetrahydrocannabinol (9-THC) antagonising cannabinoid receptor type 1 (CB1) [10].

Guduchi (Tinospora cordifolia) SD causes anxiety, cognitive dysfunctions, and muscle control impairment in certain persons. Kapikachhu contains natural Levodopa (LD) and is free of drug-induced dyskinesias. The results reveal that MP extract decreased MPTPinduced neuroinflammation and reversed biochemical and behavioural deficits in PD mice, supporting its traditional use [11].

Glyccrhiza improved motor deficits and cognitive problems in rats with postischemia and middle cerebral artery blockage by suppressing microglia activation and proinflammatory cytokine production [12].

Shankhapushpi the extract inhibited scopolamine neurotoxicity, demonstrating neuroprotective effects. CP treatment reduced scopolamine's neurotoxic effects, indicating it is neuroprotective [13].

In post-mortem Alzheimer's brain tissue, curcumin binds to fibrillar Aß plaques and CAA in its isoforms, conjugates, and bio-available forms [14].

Borage's Echium amoenum. Traditional Persian medicine use the herb boreage as a thymoleptic and anxiolytic. The ability of borage to lessen stress and despair was examined using an RCT [15].

Since antiquity, depression-related sickness have been handled with Banxia houpu, a TCM formula composed of Pinellia ternata, Poria cocos, Magnolia officinalis, Perilla frutescens, and Zingiber officinale. Banxia houpu decoction reduced blood triglyceride ranges and enhanced the activation of natural killer spleenic cells in the spleen of rats subjected to a range of mild stresses for an extended length of time in an animal model related to depression [16].

3. Phytopharmaceuticals as depressants

The anti-inflammatory compound willow bark (WB) was used to heal fever and pain. These substances contain prodrugs such as salicin those are converted to salicylic acid, the active substance, in the GIT & liver by salicylic alcohol. Cyclooxygenases (COX) are known to be inhibited by salicylic acid. Moreover, it has been presented that WB can influence important cytokines that promote and inhibit inflammation, including TNF, IL-6, IL-1, IL-10, and IL-8.IL-6, IL-1, IL-10, IL-8, TNF, and IL-1 which are few examples of important pro- and anti-inflammatory cytokines that WB can modify. Additionally, salicyl alcohol derivatives, WB's conatins polyphenols which play a part in this depression modulation. Clinical studies suggest that proinflammatory cytokines, which are present in polyphenols, may contribute to the pathophysiology of depression [17].

Length of immobilisation (desperation) times when the test animals don't want to swim are indicative of the stress which induces a depressive condition. Antidepressant medications, regardless of their composition or mode of action, promote increased activity and shorten periods of immobility [18].

The phenylpropanoid triandrin and schizandra chinensis and Echinacea purpurea tinctures had the strongest antidepressant effects in the clofelin-induced depression test. Rosavin administration increased the stimulating activity of L-DOPA as did the tinctures of Schizandra chinensis and Echinacea purpurea [19].

The rats developed a depressive condition after receiving L-DOPA treatment. This condition was distinguished by the rodents' dejected demeanour, severe hypothermia, and reduced locomotor activity. The impact was particularly pronounced in the extracts of Eleutherococcus senticosus, syringin (III), and rosavin (I), which lowered the immobilisation period.

The aerial parts belongs to the plant Polygonum viscosum include four sesquiterpenes: viscoazucine,

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(2), 1514-1519 | ISSN:2251-6727

viscosumic acid, viscoazulone & viscozulenic acid along with a flavonoid glycoside shown to have CNS depressive properties. Movement gradually slowed down, which was indicative of the strong CNS depressive effect of viscoazucine and viscoazulone. Following administration of these substances, there was a gradually reduction in movement, which indicated mild CNS depressing action [20].

Various herbal extracts include Curcuma longa, Withania somnifera, Crocus sativum, Centella asiatica, and Bacopa monniera, which contain high levels of flavonoids and antioxidant components, in a number of experimental rodent models have been demonstrated to have antidepressant effects [21].

A pentacyclic triterpenoid saponin with anti-depressive effects, wound-healing, antiulcer, and anti-hepatofibrotic activities, asiaticoside also has these properties. As a reason, the reduced oxidative stress, it helped with diabetic patients' cognitive impairment [22].

Mandukparniin is another name for C. asiatica, a plant whose leaves and preparations are believed to enhance memory. C. asiatica, sometimes referred to as "Brahmi" in traditional Ayurveda, is a plant with special medicinal characteristics. Besides this, it is also utilized as a brain tonic & it is also used as medication for rheumatism, elephantiasis, and skin conditions. Moreover, it preserves nerve cells, enhances memory, lessens pain, and prevents the death of neural cells [23].

Peganum harmala (family Zygophyllaceae) and Lepidium meyenii (family Brassicaceae) (maca) are examples of plants with potential CNS effects and antidepressant qualities. L. meyenii is utilised as a nutritional supplement and dietary energizer to enhance both physical and mental health.

Human MAO-A was suppressed by H. perforatum flower extracts have the highest levels of inhibition. Plant extracts were investigated by HPLC-DAD-MS and found to include favonoids, pseudohypericin, hypericin, hyperforin, adhyperforin, and hyperforin. The herb H. perforatum is frequently used to heal mild to moderate depression.

4. Chemical Constituents of Cucurbitaceae family

The non-nutritive chemical components of plants are known as phytochemicals and are those that exist naturally in them or are compounds that are generated from plants. Numerous phytochemicals, such as tannins, cardiac glycosides, terpenoides, polysaccharides, resins, saponins, carotenoids, and phytosterols are confirmed to exist by research on the cucurbitaceae family. Alkaloids, flavonoids, and phenolic compounds are having the most significant role with these bioactive components of plants [24].

Traditional herbal treatments for a diversity of ailments in Cucurbitaceae family. They've shown anti-inflammatory, anticancer, hepatoprotective, cardiovascular, and immunoregulatory effects [25]

The only biggest genera of Cucurbitaceae family is Trichosanthes. It is enhanced with varieties of phytochemicals and biologically active substances. Steroids, triterpenoids, and flavonoids are this plant genus's main chemical components [26].

A nutrient-rich plant with a wide variety of medicinal compounds is Momordica charantia. Various parts of the plant posses different chemical components those are beneficial [27]. Those chemical components are: Gentilic acid, guanylate cyclase inhibitors, spinasterol, gypsogenin, hydroxytryptamines, karounidiols, lanosterol, lauric acid, linolenic acid, momordenol, momordicillin, momordicinin, momordicicosides, and momordin are among the chemical components of momordica charantia, momordol, multiflorenol, myristic acid, nerolidol, oleanolic acid, oleic acid, oxalic acid, pentadecans, peptides, petroselinic acid, Alkaloids, polypeptides, proteins, ribosome-inactivating proteins, rosmarinic acid, rubixanthin, steroidal glycosides, stigmastadiols, stigmasterol, ascorbigen, bsistosterol-d-glucicide, citruline, elasterol, flavochrome, linoleic acid, lutein, lycopene, pipecolic acid, glutamic acid, thscinne, alanine, g-amino butyric acid, and pipecolic acid [28]. Reducing sugars, resins, fixed oils, Alkaloids, glycosides, saponins, phenolic compounds along with free acids are all present in fruits. Due to its special combination of qualities, Karela is a wonder medication for ailments [29].

Contents of Bryonia plant leaves are flavonoids, tannins, alkaloids, saponins, anthraquinone, terpenoids, steroids, and cardiac glycosides, according to a phytochemical analysis of several secondary metabolites. Alkaloids, flavonoids, anthraquinoin, sterols, and terpenoids are all available in the plant Bryonia. Vitamin B like thiamine (vitamin B_1), riboflavin (vitamin B_2), niacin (vitamin B_3), vitamin B_6 (vitamin B_7), and folate (vitamin B_9) are abundant in fruits and leaves [30].

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(2), 1514-1519 | ISSN:2251-6727

17 substances were isolated as an outcome of current phytochemical study on T. kirilowii, including triterpenes, sterols, flavonoids, saccharide derivatives, alkaloids, and norsesquiterpenes. The first pyroglutamac acid was discovered in T. kirilowii [31].

Procyanidin B_2, B_3, procyanidin B_9, kaempferol, and quercetin are all antioxidants derivatives and only a few of the phytoconstituents found in Cydonia oblonga. The Cydonia oblonga seed includes Citric acid, oxalic acid, and fumaric acid are examples of organic acids, along with fat-soluble compounds like tocopherol, stigmastrol, sitosterol, and vitamin C. Tyrosine, Tryptophan, Tylenol, Valine, Proline, Hydroxypyroline, Aspartic Acids, and Asparagines are only a few of the free amino acids those are sufficient in the seed. Additionally, it contains phenolic components such as rutinoside, kaempferol, stellarin, lucenin, and vicenin.

5. Conclusion

Following a thorough review of the literature, we discovered that the plants amazing medical characteristics of the Cucurbitaceae family include anti-HIV, anxiolytic, antipyretic, anti-diarrheal, carminative, antioxidant, antidiabetic, antibacterial, laxative, anthelmintic, antitubercular, purgative, and hepatoprotective effects. Some cucurbits' seeds or fruit portions are said to have purgative, emetic, and anthelmintic qualities because of the availability of the secondary metabolite cucurbitacin. The compounds of this group have been investigated for their effects on the heart, cytotoxicity, hepatoprotection, and inflammation. Future research should focus on isolating and purifying these compounds to determine their precise mode of action and evaluate their safety and efficacy. Further exploration of these plants and their bioactive constituents may contribute in the invention of effective and safe antipsychotic drugs, offering alternate therapy for individuals suffering from mental health conditions.

6. Conflict of Interest

The writers state they have no competing interests.

7. Acknowledgement

The authors thankful to the Board of Management, School of Pharmacy and Life Sciences, Centurion University, Bhubaneswar, Odisha, for providing a suitable-scientific environment to write this review article.

References

1. Haase H.J., Kaumeier S., Schwarz S., Gundel A., Libde O.K., Honess V.R., Bomhard E.R., Rauwolf E.R., Schel R., Seyfferth H., Stripf A., Stripf L., 1980. Clinical trial of droperidol for the determination of the neuroleptic threshold and the neuroleptic-therapeutic range. Int. Pharmacopsychiatry., 15, 74–80
2. Miller R., 2009. Mechanisms of action of antipsychotic drugs of different classes, refractoriness to therapeutic effects of classical neuroleptics, and individual variation in sensitivity to their actions: Part I. Curr. Neuropharmacol., 7(4), 302-314.
3. March D., Hatch S.L., Morgan C., Kirkbride J.B., Bresnahan M., Fearon P., Susser E., 2008. Psychosis and place. Epidemiol Rev., 30(1), 84–100.
4. Friedman S.H., Reed E., Ross N.E., 2023. Postpartum Psychosis. Curr Psychiatry Rep. 25(2), 65–72.
5. Gutierrez R.M.P., 2016. Review of Cucurbita pepo (Pumpkin) its Phytochemistry and Pharmacology. Med Chem. 6(1), 12-21.
6. Dubey A., Ghosh N.S., Agnihotri N., Kumar A., Pandey M., Nishad S., 2022. Hybrid Open Access Review Article Clinical Schizophrenia & Related Psychoses Herbs Derived Bioactive Compounds and their Potential for the Treatment of Neurological Disorders. Clin Schizophr Relat Psychoses. 16(2), 1-11.
7. Kelly G.S., 2001. Rhodiola rosea: a possible plant adaptogen. Altern Med Rev. 6, 293 - 302.
8. Akhondzadeh S., Tahmacebi N.P., Noorbala A.A., Amini H., Fallah H.P., Jamshidi A.H., Khani M., 2005. Crocus sativus L. in the treatment of mild to moderate depression: a double-blind, randomized and placebo-controlled trial. Phytother Res. 19(2),148-151
9. Sarangi B., Mishra K., Mohanta G.P., Manna P.K., 2019. In vitro-in vivo correlation (IVIVC) of solid lipid nanoparticles loaded with poorly water-soluble drug lovastatin. Eur. Polym. J. 122, 109366.
10. Dhama K., Sachan S., Khandia R., Munjal A., Iqbal HMN., Latheef S.K., Karthik K., Samad H.A., Tiwari

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(2), 1514-1519 | ISSN:2251-6727

R., Dadar M., 2017. Medicinal and Beneficial Health Applications of Tinospora cordifolia (Guduchi): A Miraculous Herb Countering Various Diseases/Disorders and its Immunomodulatory Effects. Recent Pat Endocr Metab Immune Drug Discov. 10(2), 96-111.

11. Chakravarthi K.K., Avadhani R., 2013. Beneficial effect of aqueous root extract of Glycyrrhiza glabra on learning and memory using different behavioral models: An experimental study. J Nat Sci Biol Med. 4(2), 420-425.
12. Kim T.D., Vui D.T., Ngoc H.N.T., Duyen D.K., Thanh T.B., 2019. The use of Huperzia species for the treatment of Alzheimer's disease. J Basic Clin Physiol Pharmacol. 31(3), 20190159.
13. He X.J., Uchida K., Megumi C., Tsuge N., Nakayama H., 2015. Dietary curcumin supplementation attenuates 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP) neurotoxicity in C57BL mice. J. Toxicol. Pathol. 28, 197–206.
14. Sayyah M., Sayyah M., Kamalinejad M., 2006. A preliminary randomized double blind clinical trial on the efficacy of aqueous extract of Echium amoenum in the treatment of mild to moderate major depression. Prog Neuropsychopharmacol Biol Psychiatry. 30(1), 166-169.
15. Luo L., Nong W.J., Kong L.D., Jiang Q.G., Tan R.X., 2000. Antidepressant effects of Banxia Houpu decoction, a traditional Chinese medicinal empirical formula. J Ethnopharmacol. 73(1-2), 277-281.
16. Ulrich M.G., Kelber O., Koptina A., Freischmidt A., Heilmann J., Muller J., Zeitler H., Seidel M.F., Ludwig M., Heinrich E.U., Winterhoff H., 2012. Novel neurological and immunological targets for salicylate-based phytopharmaceuticals and for the anti-depressant imipramine. Phytomed. 19(10), 930-939.
17. Annu., Baboota S., Ali J., 2021. Combination antipsychotics therapy for schizophrenia and related psychotic disorders interventions: Emergence to nanotechnology and herbal drugs. J. Drug. Del. Sci. Technol. 61, 102272.
18. Kurkin V.A., Dubishchev A., Ezhkov V.N., Titova I.N., Avdeeva E.V., 2006. Antidepressant activity of some phytopharmaceuticals and phenylpropanoids. Pharmaceu Chem J. 40, 614-619.
19. Datta B.K., Datta S.K., Chowdhury M.M., Khan T.H., Kundu J.K., Rashid M.A., Nahar L., Sarker S.D., 2004. Analgesic, antiinflammatory and CNS depressant activities of sesquiter-penes and a flavonoid glycoside from Polygonum viscosum. Nat Prod. 35(28), 222–225.
20. Kumar A., Konar A., Garg S., Kaul S.C., Wadhwa R., 2021. Experimental evidence and mechanism of action of some popular neuro-nutraceutical herbs. Neurochem Int. 149, 105124.
21. Sahoo H.B., Sahoo S.K., Mishra K., Sagar R., 2015. Evaluation of the wound-healing potential of Amaranthus viridis (Linn.) in experimentally induced diabetic rats. Int. J. Nutri. Pharmacol Neurol. Dis. 5(2), 50-55.
22. Nisha K., Sheel R., Kumar J., 2015. Tissue damage induces in vivo production of asiaticoside in Centella asiatica (Linn.) Urban. Int J Sci Res. 4(4), 2943-2945.
23. Rajasree R.S., Sibi P.I., Femi F., Helen W., 2016. Phytochemicals of Cucurbitaceae Family – A Review. Int. J. Pharmacog. Phytochem. Res. 8(1), 113-123.
24. Dhiman K., Gupta A., Sharma D.K., Gill N.S., Goyal A., 2012. A Review on The Medicinally Important Plants of the Family Cucubitaceae. Asian. J. Clin. Nutr. 4(1), 16-26.
25. Pabuprapap W., Suksamrarn A., 2021. Chemical constituents of the genus Trichosanthes (Cucurbitaceae) and their biological activities: A review. Sci. Asia. 47(SP-1), 1–13.
26. Tanwar S., Dhakad P., Dhingra G, Tanwar K., 2022. A review on salient pharmacological features and chemical constituents of Bitter Melon. Biol Sci. 2(2), 229-239.
27. Braca A., Siciliano T., Arrigo M.D., German M.P., 2008. Chemical composition and antimicrobial activity of Momordica charantia seed essential oil. Fitoterapia. 79(2), 123-125.
28. Xu B., Li Z., Zeng T., Zhan J., Wang S., Ho C.T., Li S., 2022. Bioactives of Momordica charantia as Potential Anti-Diabetic/Hypoglycemic Agents. Mol. 27(7), 2175.
29. KADHIM E.J., 2014. Phytochemicals investigation and hepato-protective studies of Iraqi Bryonia dioica (family Cucurbitaceae). Int. J. Pharm. Pharmaceu. Sci. 6(4), 1-5.

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(2), 1514-1519 | ISSN:2251-6727

30. Xu Y., Chen G., Lu X., Li Z.Q., Su S.S., Zhou C., Pei Y.H. 2012. Chemical constituents from Trichosanthes kirilowii Maxim. Biochem Sys. Ecolo. 43, 114–116.
31. Ganaie M.U.D., Behl T., Nijhawan P., Sachdeva M., Khan N., 2020. Investigation of anti-depressant effect of aqueous and ethanolic extract of Cydonia oblonga in rats. Obes Med. 18, 100202.