

A REVIEW ON PSYCHOSIS AND ANTI-PSYCHOTIC PLANTS**MONU YADAV*, MILIND PARLE, MONIKA KADIAN, KAILASH SHARMA**

Department of Pharmaceutical Sciences, Division of Pharmacology, Guru Jambheshwar University of Science and Technology, Post Box-38, Hisar - 125 001, Haryana, India. Email: monuyadav.pharmacology@gmail.com

Received: 17 April 2015, Revised and Accepted: 10 May 2015

ABSTRACT

Psychosis (schizophrenic, schizoaffective, and affective illnesses) is a group of serious illnesses that affect the mind. About 1% of the population suffers from psychosis worldwide and increases for those, whose closer family member have suffered with the disorder. Common symptoms of psychosis are hallucinations, delusions, flat affect, forgetfulness, alogia, avolition, and anhedonia. Currently available marketed drugs like chlorpromazine, haloperidol, clozapine, risperidone, and olanzapine have some serious adverse effects such as dizziness, diabetes, weight gain, tardive dyskinesia, neuroleptic malignant syndrome, sexual dysfunction, agitation, and sedation. There is no satisfactory remedy available for prevention and management of psychosis. Therefore, the demand for herbal medicine is increasing. This article collects the information about the possible plants and dietary supplements to improve symptoms of psychosis with no side effect. The present review discusses about anti-psychotic plants, its biological source, common name, and other biological activities, which are helpful for researchers to development new anti-psychotic herbal formulations.

Keywords: Psychosis, Anti-psychotic drugs, Dietary supplements, Anti-psychotic plants.

INTRODUCTION

Mental disorders have become highly prevalent due to ambitious lifestyle, urbanization, and stressful environment. Psychosis is a one of the most debilitating, complex, and costly illness. The meaning of "psyche" is mind or soul, and word "-osis" corresponds to an abnormal condition in Greek. Hence, psychosis is often described as involving a "loss of contact with reality." These illnesses alter a person's ability to think clearly, make good judgments, respond emotionally, communicate effectively, understand reality, and behave appropriately. It is characterized by three general types of symptoms: Positive symptoms, negative symptoms, and cognitive symptoms. Positive symptoms refer to a loss of contact with reality and comprise of hallucinations, delusions, bizarre behavior, and positive formal thought disorders. Negative symptoms refer to a diminution in or absence of normal behaviors and include flat affect, alogia, avolition, and anhedonia. Cognitive symptoms manifest as deficits in attention, learning, memory, concentration, and executive functions (abstract thinking, problem solving) [1].

Risk factors of psychosis [2]

- A family history of psychosis or psychotic disorders
- An inherited disorder exacerbated by stress and hormonal changes
- A neurodegenerative disorder (such as Alzheimer, Parkinson's)
- A viral infection
- Chemical imbalances in the brain such as dopamine, glutamate, gamma-aminobutyric acid, acetylcholine, serotonin, and norepinephrine
- Depletion of certain fatty acids in cell membranes
- Drug abuse or traumatic injury
- Dietary exorphins from milk
- Genetic predisposition interacting with an overload of dietary proteins
- Miswiring of the brain during development
- Perinatal hypoxia
- Social stressors in urban settings
- Anti-depressants and serotonin reuptake blockers, such as ecstasy, lysergic acid diethylamide, and prozac generate hallucinations and false memory
- Chronic alcoholics suffer loss of gray matter, cognitive dysfunction, disorganization of thought, and memory loss
- PCP or phencyclidine also known as "angel dust" causes both the positive as well as negative symptoms of psychosis

- Purified cocaine and pure methamphetamine cause the positive symptoms of schizophrenia, and dysphoria upon withdrawal
- Special K, also known as ketamine, causes a schizophrenia-like psychosis in the healthy individuals.

PHARMACOLOGICAL TREATMENT OF PSYCHOSIS

The anti-psychotic drugs are also termed as neuroleptic drugs, or neuroleptics, which is derived from Greek in which neuro refers to the nerves and lept means "to take hold of". Thus, the word neuroleptic means "taking hold of one's nerves." Antipsychotic agents are the cornerstone of acute and maintenance treatment of schizophrenia and are effective in the treatment of hallucinations, delusions, and thought disorders. Antipsychotic medications are commonly classified into two categories: First generation (typical) and second generation (atypical). First generation (typical) antipsychotic drugs: Chlorpromazine, the first antipsychotic drug, was a phenothiazine developed as a surgical anesthetic. Soon after the introduction of chlorpromazine, another drug reserpine, a derivative of the rauwolfia plant, was introduced as an anti-psychotic. Typical antipsychotic drugs are chlorpromazine, trifluoperazine, thioridazine, trifluoperazine, fluphenazine, haloperidol, trifluoperidol, penfluridol, flupenthixol, pimozide, and loxapine. Second generation (atypical) anti-psychotic drugs are clozapine, risperidone, olanzapine, aripiprazole, quetiapine, ziprasidone, and sulpiride [3]. The typical antipsychotics are classified according to their chemical structure while the atypical antipsychotics are classified according to their pharmacological properties. The major difference between the two types of antipsychotics is that the first generation drugs block dopamine and the second generation drugs block dopamine and also affect serotonin levels. Although atypical antipsychotics are generally considered to be more effective and to have reduced side-effects compared to typical antipsychotics. Evidence suggests that some of the second generation drugs have milder movement related side-effects than the first generation drugs. The second generation antipsychotics are usually the first choice for the treatment of schizophrenia. Clozapine is exceptional in that it often works even when other medications have failed; however, because it requires monitoring of white blood cell counts, it is not the first choice for treatment. Considering the adverse effects of synthetic anti-psychotic drugs includes dizziness, diabetes, weight gain, tardive dyskinesia, neuroleptic malignant syndrome, sexual dysfunction, agitation, and sedation, continuous search for safe natural remedies is need of the hour [4]. Herbal medicines are in great

demand in the developed as well as developing countries for primary healthcare because of their wide medicinal activities, higher safety margins, and lesser costs (Table 1). Dietary supplements along with herbal medicines may improve symptoms of psychosis.

Some dietary supplements to improve symptoms of psychosis

Antioxidant vitamins

It is reported that there is an increase in free radical generation in schizophrenia and the anti-oxidants helps to decrease the risk of

Table 1: A brief description of some anti-psychotic plants

Serial number	Botanical source	Common name	Other biological activities	References
1	<i>Acorus gramineus</i> Family: Araceae	Japanese sweet flag	Insecticidal and anti-fungal	[7,8]
2	<i>Albizia inpinata</i> Family: Leguminosae	Maloxo	Hypotensive and vasorelaxant	[9,10]
3	<i>Aegle marmelos</i> Family: Rutaceae	Bael	Analgesic, anti-inflammatory, anti-pyretic, anti-cancer, anti-oxidant, anti-ulcer, anti-diabetic, anti-thyroid, anti-viral, anti-bacterial, and anti-fungal	[11,12]
4	<i>Allium cepa</i> Family: Liliaceae	Onion	Anti-hypercholesterolemic, hypoglycemic, anti-platelets, anti-oxidant, anti-cancer, and anti-microbial	[13]
5	<i>Alstonia scholaris</i> Family: Apocynaceae	Devil tree	Anti-depressant, anti-anxiety, anti-oxidant, analgesic, anti-inflammatory, anti-microbial, anti-diarrheal, hepatoprotective, anti-cancer, anti-diabetic, and anti-arthritis	[14,15]
6	<i>Amblygonocarpus andongensis</i> Family: Mimosaceae	Scotsman's rattle	Anti-nociceptive, anti-inflammatory, and anti-microbial	[16]
7	<i>Areca catechu</i> Family: Arecaceae	Betel nut	Anti-microbial, anthelmintic, and anti-oxidant	[17]
8	<i>Bauhinia tomentosa</i> L Family: Fabaceae	Yellow bell	Anti-oxidant, anti-fungal, anti-hyperglycemic, and anti-inflammation	[18]
9	<i>Bryosonima crassifolia</i> Family: Fabaceae	Nanche	Wound healing, anti-inflammatory, anti-oxidant, hypoglycemic, and anti-microbial	[19,20]
10	<i>Cannabis sativa</i> Family: Cannabaceae	Marijuana	Anti-epileptic, anti-pyretic, anti-parasitic, and anti-emetic	[21]
11	<i>Catunargaom Spinosa</i> Family: Rubiaceae	Mountain pomegranate	Anti-bacterial, anti-fungal, and anti-viral	[22]
12	<i>Chrysanthellum indicum</i> Linn. Family: Compositae	Rariyar kasa (Kontagora), Dunkufe (Zaria)	Anti-tumor, anti-amoebic, diuretic, hypoglycemic, and anti-oxidant	[23]
13	<i>Crocus sativus</i> Family: Iridaceae	Saffron	Memory enhancer, anti-depression, anti-inflammatory, anti-tumor, and radical-scavenging	[24-26]
14	<i>Coccinia grandis</i> Family: Cucurbitaceae	Scarlet and Parval	Anti-diabetic, analgesic, anti-pyretic, anti-inflammatory, hepatoprotective, anti-tuberculosis, anti-malarial, anti-bacterial, anti-oxidant, anti-cancer, and anti-ulcer	[11,27]
15	<i>Datura metel</i> Family: Solanaceae	Thorn apple	Analgesic, anti-spasmodic, antitussive, and bronchodilator	[28]
16	<i>Delonix regia</i> Family: Fabaceae	Gulmohar	Wound healing, hepatoprotective, anti-inflammatory, anti-bacterial, and anti-malarial	[29,30]
17	<i>Euphorbia neriifolia</i> Family: Euphorbiaceae	Thor	Anti-anxiety, anticonvulsant, anti-oxidant, anti-inflammatory, analgesic, anti-diabetic, aphrodisiacs, and hepatoprotective	[31,32]
18	<i>Ficus hirta</i> Family: Moraceae	Devil fig	Anti-oxidant, anti-inflammatory analgesic, and anti-bacterial	[11]
19	<i>Ficus platyphylla</i> Family: Moraceae	Flake rubber tree	Analgesic, anti-inflammatory, and anticonvulsant	[33,34]
20	<i>Firmiana simplex</i> Family: Sterculiaceae	Chinese parasol tree	Anti-oxidant and hepatoprotective	[35,36]
21	<i>Ginkgo biloba</i> Family: Ginkgoaceae	Maidenhair tree	Anti-oxidant and treat cerebral hemorrhage	[23]
22	<i>Gliricidia sepium</i> Family: Leguminosae	Gliricidia	Anti-bacterial, anti-fungal, and anti-oxidant	[37,38]
23	<i>Hypericum perforatum</i> Family: Hypericaceae	St john's wort	Treat minor burns, wounds, skin inflammation and treat nerve pain	[23]
24	<i>Ipomoea reniformis</i> Family: Convolvulaceae	Undirkana or mushakparni	Anti-diabetic, anti-inflammatory, anti-epileptic, anti-oxidant, anxiolytic, neuroprotective and anti-microbial	[39]
25	<i>Litsea polyantha</i> Family: Lauraceae	Barkukuchita	Anti-inflammatory, anti-diarrheal, anti-oxidant, anti-depressant, anti-bacterial, anti-fungal, anti-HIV, and anti-thrombotic	[11]
26	<i>Lonchocarpus cyanescens</i> Family: Fabaceae	Indigo vine	Anti-oxidant, anti-anxiety, and anti-inflammatory	[40]
27	<i>Morus alba</i> Family: Moraceae	White mulberry	Anti-microbial, anti-oxidant, anti-HIV, neuroprotective, and anti-stress	[41]
28	<i>Morinda citrifolia</i> Family: Rubiaceae	Noni	Analgesic, anti-inflammatory, anti-oxidant, anti-tumor, hepatoprotective, anti-fungal, anxiolytic, and anti-epileptic	[42]

Contd...

Table 1: Continued...

Serial number	Botanical source	Common name	Other biological activities	References
29	<i>Nardostachys jatamansi</i> Family: Valerianaceae	Jatamansi	Anti-depressant, anticonvulsant, anti-parkinson's, and nootropic and neuroprotective	[43]
30	<i>Ocotea duckei</i> Family: Lauraceae	Sweet weed	Anti-mycobacterial, anti-leishmanial, and anti-depressant	[44]
31	<i>Ocimum sanctum</i> Family: Lamiaceae	Tulsi	Analgesic, anti-inflammatory, anti-ulcer, anti-anxiety, anti-asthmatic, anti-fertility, anti-cancer, anticonvulsant, anti-diabetic, anti-hyperlipidemic, and anti-oxidant	[45]
32	<i>Panax ginseng</i> Family: Araliaceae	American ginseng	Anti-sterility, anti-proliferative, adaptogenic, memory enhancing, anti-inflammatory, and anti-diabetic	[46]
33	<i>Passiflora incarnata</i> Family: Passifloraceae	Passion flower	Antitussive, anti-inflammatory, anti-asthmatic, anti-anxiety, anticonvulsant, analgesic, and aphrodisiac	[47]
34	<i>Piper retrofractum</i> Family: Piperaceae	Long cayva	Mosquito larvicidal, anti-microbial, aphrodisiac, anti-hypertensive, and anti-fungal	[11,48]
35	<i>Randia dumetorum</i> Family: Rubiaceae	Emetic nut	Analgesic, anti-inflammatory, anti-allergic, and anti-bacterial	[49]
36	<i>Rauwolfia tetraphylla</i> Family: Apocynaceae	Devil pepper	Anti-bacterial, anti-diabetic, anti-viral, and aphrodisiac	[50]
37	<i>Rhodiola rosea</i> Family: Crassulaceae	Golden root	Anti-depression and anti-anxiety	[11]
38	<i>Saccharum spontaneum</i> Family: Poaceae	Sugar cane	Anti-bacterial, anti-fungal, cytotoxic, and anti-oxidant	[51]
39	<i>Securinega virosa</i> Family: Euphorbiaceae	Bushweed	Anti-diabetic, anti-oxidant, anti-rheumatism, anti-diarrheal, and anti-epileptic	[52,53]
40	<i>Solanum nigrum</i> Family: Solanaceae	Black nightshade	Anticonvulsant, anti-cancer, anti-microbial, anti-ulcerogenic, and anti-inflammatory	[54]
41	<i>Terminalia bellerica</i> Family: Combretaceae	Bahera	Analgesic, anti-inflammatory, anti-cancer, anti-depressant, anti-diabetic, anti-ulcer, anti-fertility, anti-hypertensive, anti-microbial, and anti-oxidant	[55]
42	<i>Tetracarpidium conophorum</i> Family: Euphorbiaceae	Nigerian walnut	Anti-oxidant, anti-microbial, anthelmintic, and anti-dote to snakebite	[56,57]
43	<i>Thevetia peruviana</i> Family: Apocynaceae	Lucky nut	Anti-microbial, antispermatogenic, anti-inflammatory, and anti-diarrheal	[11,58]
44	<i>Tinospora cordifolia</i> Family: Menispermaceae	Guduchi	Anti-microbial, anti-spasmodic, anti-inflammatory, anti-arthritis, anti-allergic, anti-diabetic, anti-stress, and anti-oxidant	[59,60]
45	<i>Valeriana officinalis</i> Family: Valerianaceae	All-Heal	Anxiolytic, anti-depressant, and anti-arrhythmic	[61]
46	<i>Vitex negundo</i> Family: Verbenaceae	Monk' pepper	Anti-inflammatory, analgesic, anticonvulsant, anti-oxidant, anti-gonorrhoeic, anti-arthritis	[62]
47	<i>Withania somnifera</i> Family: Solanaceae	Ashwagandha	Anti-oxidants, anti-parkinson's, and anti-inflammatory	[63]
48	<i>Zizyphus jujuba</i> Family: Rhamnaceae	Sour date	Anti-anxiety, anti-oxidant, and wound healing	[64]

schizophrenia. Oral supplementation of Vitamin C, Vitamin E, with atypical antipsychotic reduces oxidative stress, and improves brief psychiatric rating scale score [5].

Eicosapentaenoic acid (EPA) omega-3 fish oils

Some researchers suggest that people have schizophrenia may benefit by a reduction in symptoms, when they take fish oil capsules that are high in the EPA (a type of Omega-3 fatty acid) form of oil.

Glycine

The N-Methyl-D-aspartate (NMDA) receptor has a number of modulatory sites that affect its activity. Within the channel, there is a binding site for the dissociative anesthetics such as PCP ("angel dust") and ketamine, which serve as non-competitive antagonists and produces symptoms of schizophrenia. Glycine is known to act as an agonist for NMDA. It may turn out to be a very beneficial supplemental treatment, when added to standard antipsychotic medications [6].

CONCLUSION

Plants have been used for the treatment of diseases all over the world since the beginning of civilization. There has been growing interest in the therapeutic use of plants because of their safety, economical, and

effective use. In this review, some plants have been mentioned, which are previously explored by the various researchers for their antipsychotic activity. Collectively, behavioral studies of plants have created a unique opportunity for the development of new pharmacotherapies for psychosis. The herbal extracts and constituents with demonstrable psychotherapeutic effects in animal models may deserve further evaluation in clinical studies. Some dietary supplements such as antioxidant vitamins, EPA omega-3 fish oils also helps to improve symptoms of psychosis. Therefore, better results can be achieved by herbal therapy along with dietary supplements. On the other hand, our health also depends on our lifestyle choice.

ACKNOWLEDGMENTS

The authors are grateful to the authors/editors of all those articles, journals, and books from where the literature for this article has been reviewed and discussed.

REFERENCES

1. Parle M, Sharma K. Schizophrenia: A review. Int Res J Pharm 2013;4:52-5.
2. Parle M, Sharma K. Biomarker and causative factor of schizophrenia. Int Res J Pharm 2013;4:78-85.

3. Kamble RA, Oswal RJ, Antre RV, Adkar PP, Bayas JP, Bagul Y. Antipsychotic activity of *Catunargaom Spinosa* (Thumb.). Res J Pharm Biol Chem Sci 2011;2:664-8.
4. Lieberman JA, Stroup TS, McEvoy JP, Swartz MS, Rosenheck RA, Perkins DO, et al. Effectiveness of antipsychotic drugs in patients with chronic schizophrenia. N Engl J Med 2005;353(12):1209-23.
5. Rukmini MS, D'Souza B, D'Souza V. Superoxide dismutase and catalase activities and their correlation with malondialdehyde in schizophrenic patients. Indian J Clin Biochem 2004;19(2):114-8.
6. Chatterjee M, Ganguly S, Srivastava M, Palit G. Effect of 'chronic' versus 'acute' ketamine administration and its 'withdrawal' effect on behavioural alterations in mice: Implications for experimental psychosis. Behav Brain Res 2011;216(1):247-54.
7. Cho J, Kong JY, Jeong DY, Lee KD, Lee DU, Kang BS. NMDA receptor-mediated neuroprotection by essential oils from the rhizomes of *Acorus gramineus*. Life Sci 2001;68(13):1567-73.
8. Park C, Kim S, Ahn YJ. Insecticidal activity of asarones identified in *Acorus gramineus* rhizome against three coleopteran stored-product insects. J Stored Prod Postharvest Res 2003;39:333-42.
9. Assis TS, Almeida RN, Barbosa-Filho JM, Medeiros IA. CNS pharmacological effects of the total alkaloidal fraction from *Albizia inopinata* leaves. Fitoterapia 2001;72(2):124-30.
10. Pires SL, de Assis TS, de Almeida RN, Filho JM, Julien C, de Medeiros IA. Endothelium-derived nitric oxide is involved in the hypotensive and vasorelaxant responses induced by the aqueous fraction of the ethanolic extract of the leaves of *Albizia inopinata* (Harms) G. P. Lewis in rats. Phytomedicine 2000;7(2):91-8.
11. Ahmed MN, Kavidul Azam MN. Traditional knowledge and formulations of medicinal plants used by the traditional medical practitioners of Bangladesh to treat schizophrenia like psychosis. Schizophr Res Treatment 2014;2014:679810.
12. Sharma GN, Dubey SK, Sharma P, Sati N. Medicinal values of bael (*Aegle marmelos*) (L.) Corr.: A review. Int J Curr Pharm Rev Res 2011;1:12-22.
13. Kadian R, Parle M. Evaluation of anti-psychotic effect of *Allium Cepa*. World J Pharm Pharm Sci 2014;3:1146-59.
14. Dey A. *Alstonia scholaris* Linn. R. Br (Apocynaceae): Phytochemistry and pharmacology: A concise review. J Appl Pharm Sci 2011;01:51-7.
15. Pratap B, Chakraborty GS, Mogha N. Complete aspects of *Alstonia scholaris*. Int J Pharm Sci Rev Res 2013;5:17-26.
16. Nwinyi FC, Ajoku GA, Aniagu SO, Kubmarawa D, Enwerem N, Dzarma S, et al. Pharmacological justification for the ethnomedicinal use of *Amblygonocarpus andongensis* stem bark in pain relief. Afr J Biotechnol 2006;5:1566-71.
17. Alphons AB, Rphael RK. Potential anti-microbial, anthelmintic and anti-oxidant properties of *Areca catechu* L. Root. Int J Pharm Pharm Sci 2014;6:486-9.
18. Joseph A, Chakraborty M, Kamath JV. *Bauhinia tomentosa*: A phytopharmacological review. Int Res J Pharm 2011;2:128-31.
19. Béjar E, Malone MH. Pharmacological and chemical screening of *Byrsonima crassifolia*, a medicinal tree from Mexico. Part I. J Ethnopharmacol 1993;39(2):141-58.
20. Muñiz-Ramirez A, Perez-Gutierrez RM, Garcia-Baez E, Mota-Flores JM. Anti-microbial activities of diterpene labdane from seeds of *Byrsonima crassifolia*. Bol Latinoam Caribe Plant Med Aromat 2014;13(1):31-7.
21. Lozano I. The therapeutic use of *Cannabis sativa* (L.) in Arabic medicine. J Cannabis Ther 2001;1:66-70.
22. Dumbre T, Pawan J, Oswal RJ, Antre RV, Panjwani DT. Anti-microbial study of dried leaves of *Catunargaom spinosa* (thumb). Int J Pharm Res Dev 2010;2:101-5.
23. Yaro AH, Anuka JA, Salawu OA, Magaji MG. Behavioural effects of methanol extract of *Chrysanthellum indicum* in mice and rats. Niger J Pharm Sci 2007;6:127-33.
24. Kumari R, Kaundal M, Ahmad Z, Ashwalayan VD. Herbal and dietary supplements in treatment of schizophrenia: An approach to improve therapeutics. Int J Pharm Sci Rev Res 2011;10:217-24.
25. Hosseinzadeh H, Karimi GH, Niapoor M. Anti-depressant effects of *Crocus sativus* stigma extracts and its constituents, crocin and safranal, in mice. Acta Hort 2004;650:435-45.
26. Abdullaev FJ. Biological effects of saffron. Biofactors 1993;4:83-6.
27. Pekamwar SS, Kalyankar TM, Kokate SS. Pharmacological activities of *Coccinia Grandis*: Review. J Appl Pharm Sci 2013;3:114-9.
28. Adeola BS, Metel DL. Analgesic or hallucinogen? "Sharro" perspective. Middle East J Sci Res 2014;21:993-7.
29. El-Sayed AM, Ezzat SM, Salama MM, Sleem AA. Hepatoprotective and cytotoxic activities of *Delonix regia* flower extracts. Pharmacogn J 2011;3:49-56.
30. Shewale VD, Deshmukh TA, Patil LS, Patil VR. Anti-Inflammatory Activity of *Delonix regia* (Boj. Ex. Hook). Adv Pharmacol Sci 2012;2012:789713.
31. Bigoniya P, Rana AC. Psychopharmacological profile of hydro-alcoholic extract of *Euphorbia nerifolia* leaves in mice and rats. Indian J Exp Biol 2005;43(10):859-62.
32. Ahmed SA, Nazim S, Siraj S, Siddik PM, Wahid CA. *Euphorbia nerifolia* Linn: A phytopharmacological review. Int Res J Pharm 2011;2:41-8.
33. Ben AC, Joseph AA, George L, Abdullahi HY, Simon SA, Samson A, et al. Psychopharmacological properties of the saponin fraction of *Ficus platyphylla* stem bark Ben. Int J Biol Chem Sci 2008;2:239-48.
34. Wakeel OK, Aziba PI, Ashorobi RB, Umukoro S, Aderibigbe AO, Awe EO. Neuropharmacological activities of *Ficus platyphylla* stem bark in mice. Afr J Biomed Res 2004;7:75-7.
35. Son YK, Lee MH, Han YN. A new antipsychotic effective neolignan from *Firmiana simplex*. Arch Pharm Res 2005;28(1):34-8.
36. Kim JW, Yang H, Cho N, Kim B, Kim YC, Sung SH. Hepatoprotective constituents of *Firmiana simplex* stem bark against ethanol insult to primary rat hepatocytes. Pharmacogn Mag 2015;11(41):55-60.
37. Morales Cifuentes C, Gómez-Serranillos MP, Iglesias I, Villar del Fresno AM, Morales C, Paredes ME, et al. Neuropharmacological profile of ethnomedicinal plants of Guatemala. J Ethnopharmacol 2001;76(3):223-8.
38. Nazli R, Sohail T, Nawab B, Yaqeen Z. Anti-microbial property of *Gliricidia sepium* plant extract. Pak J Agric Res 2011;24:1-4.
39. Chitra KK, Babitha S, Durg S, Thippeswamy BS, Veerapur VP, Badami S. Anti-epileptic and anti-psychotic effects of *Ipomoea reniformis* (Convolvulaceae) in experimental animals. J Nat Remedies 2014;14(2):153-63.
40. Arowona IT, Sonibare MA, Umukoro S. Antipsychotic property of solvent-partitioned fractions of *Lonchocarpus cyanescens* leaf extract in mice. J Basic Clin Physiol Pharmacol 2014;25(2):235-40.
41. Zafar MS, Muhammad F, Javed I, Akhtar M, Khaliq T, Aslam B, et al. White mulberry (*Morus alba*): A brief phytochemical and pharmacological evaluations account. Int J Agric Biol 2013;15:612-20.
42. Pandey V, Narasingam M, Mohamed Z. Antipsychotic-like activity of noni (*Morinda citrifolia* Linn.) in mice. BMC Complement Altern Med 2012;12:186.
43. Jash R, Choudary KA, Prasanth DS. Evaluation of anti-psychotic activity of ethanolic extract of *Nardostachys jatamansi* on wistar albino rat. Int J Pharm Sci Res 2013;4:2730-6.
44. Morais LC, Barbosa-Filho JM, Almeida RN. Central depressant effects of reticuline extracted from *Ocotea duckei* in rats and mice. J Ethnopharmacol 1998;62(1):57-61.
45. Kadian R, Parle M. Anti-psychotic potentials of *Ocimum sanctum* Leaves. Int J Pharm Sci Drug Res 2015;7:46-51.
46. Lakshmi T, Roy A, Geetha RV. *Panax ginseng* a universal panacea in the herbal medicine with diverse. Asian J Pharm Clin Res 2011;4:14-8.
47. Ingalea SP, Kastureb SB. Psychopharmacological profile of *Passiflora Incarnata* Linn in mice. Int J Phytopharmacol 2012;3:263-8.
48. Nunning R, Moch SB. The aphrodisiac effect and toxicity of combination *Piper retrofractum* L, *Centella asiatica*, and *Curcuma domestica* infusion. Health Sci J Indones 2012;3:19-22.
49. Patel RG, Pathak NL, Rathod JD, Patel LD, Bhatt NM. Phytopharmacological properties of *Randia dumetorum* as a potential medicinal tree: An overview. J Appl Pharm Sci 2011;1:24-6.
50. Maurya A, Gupta S, Srivastava SK. Large-scale separation of antipsychotic alkaloids from *Rauwolfia tetraphylla* L. by pH-zone-refining fast centrifugal partition chromatography. J Sep Sci 2013;36(2):407-13.
51. Ripa FA, Haque M, Haque IU. *In vitro* anti-microbial, cytotoxic and anti-oxidant activity of flower extract of *Saccharum spontaneum* Linn. Eur J Sci Res 2009;30:478-83.
52. Magaji MG, Mohammed M, Magaji RA, Musa AM, Abdu-Aguye I, Hussaini IM. Evaluation of the antipsychotic potential of aqueous fraction of *Securinega virosa* root bark extract in mice. Metab Brain Dis 2014;29(1):161-5.
53. Danlami U, David BM, Joyce OO, Olutayo O, Thomas SA. The anti-oxidant potentials and phytochemical properties of the hexane, ethyl acetate and ethanolic extracts of *Securinega virosa* (Euphorbiaceae) Leaves. J Appl Pharm Sci 2013;3(5):131-3.
54. Perez RM, Perez JA, Garcia LM, Sossa H. Neuropharmacological activity of *Solanum nigrum* fruit. J Ethnopharmacol 1998;62(1):43-8.
55. Kadian R, Parle M, Yadav M. Therapeutic potential and phytopharmacology of *Terminala bellerica*. World J Pharm Pharm Sci

- 2014;3:804-19.
56. Aladeokin AC, Umukoro S. Psychopharmacological properties of an aqueous extract of *Tetracarpidium conophorum* Hutch. and Dalziel in mice. *J Nat Med* 2011;65(3-4):411-6.
 57. Ajaiyeoba EO, Fadare DA. Anti-microbial potential of extracts and fractions of the African walnut – *Tetracarpidium conophorum*. *Afr J Biotechnol* 2006;5:2322-5.
 58. Singh K, Agrawal KK, Mishra V, Uddin SM, Shukla A. A review on: *Thevetia peruviana*. *Int Res J Pharm* 2012;3:74-7.
 59. Jain BN, Jain VK, Shete A. Antipsychotic activity of aqueous ethanolic extract of *Tinospora cordifolia* in amphetamine challenged mice model. *J Adv Pharm Technol Res* 2010;1:30-3.
 60. Singh SS, Pandey SC, Srivastava S, Gupta VS, Patro B, Ghosh AC. Chemistry and medicinal properties of *Tinospora cordifolia* (guduchi). *Indian J Pharmacol* 2003;35:83-91.
 61. Murti K, Kaushik M, Sangwan Y, Kaushik A. Pharmacological properties of *Valeriana officinalis*- A review. *Pharmacologyonline* 2011;3:641-6.
 62. Tandon VR. Medicinal uses and biological activities of *Vitex negundo*. *Indian J Nat Prod Resour* 2005;4:162-5.
 63. Kumar VS, Kumar A. Therapeutic uses of *Withania somnifera* (ashwagandha) with a note on withanolides and its pharmacological actions. *Asian J Pharm Clin Res* 2011;4:1-4.
 64. Mahajan RT, Chopda MZ. Phyto-pharmacology of *Ziziphus jujuba* mill - A plant review. *Pharmacogn Rev* 2009;3:320-9.