Literature survey reveals that a large number of plants and their constituents have been reported to possess antidepressant activity.

1. **Singh R.K. et al., (1998)** reported that Petroleum ether (PE), Benzene (BE), Chloroform (CE), Acetone (AE) and ethanolic (EE) extract of dried *Abies pindrow* leaves showed significant antidepressant activity in rats when given 30-45 min before. All the extract except EE decreased swim stress immobility in mice indicating some degree of antidepressant activity. Chemically extract showed the presence of glycoside, steroid, terpenoids and flavonoids. Toxicity studies indicated that extract had an extended safety index. Ethanolic extract of *A. pindrow* has been reported to yield glycopyranoside, hydroxy-flavaone and chalone glycoside, bioflavonoids.

2. **Molina H.M. et al., (2002)** studied antidepressant effects of a water-soluble extract of *Agastache mexicana* in male Wister rats. *A. mexicana* did not change immobility in the forced swimming test (i.e. had no antidepressant effect) but increased the anti-immobility action of 32.0 mg/kg body wt, (i.p.) of Desipramine (i.e. increased the antidepressant-like effect of Desipramine).

3. **Hasrat J.A. et al., (1997)** reported that the fruits and leaves of *Annona muricata* were used in traditional medicine for their tranquilizing and sedative properties. Extract of the plant has been shown to inhibit binding of $[^3]H$ rauwolscine to 5-HTergic 5-HT IA receptor in Calf hippocampus and showed antidepressant activity. The three alkaloid (isoquinoline derivative) annonaine, norruciferime and asimilobine isolated from the fruits.

4. **Hoong D.T.L. et al., (2002)** fractionated and isolated of dichloromethane fraction of *Aquilaria agollocha* by bioassay-directed fractionation. Four compounds having MOA inhibitory effect were isolated by repeated silica gel column chromatography. There structures were established as psoralen, bergaptan, alpha amyrin acetate and 5 hydroxymethylfurfural on the basis of their physiochemical and spectral data. Among these compounds psoralen and bargapten showed high inhibitory activities in vitro against mouse brain monoamine oxidase hence proved as antidepressant.

5. **Nishibe S. et al., (2002)** reported that an extract of the leaves of *Apocynum venetum* markedly shortened the immobility time of male rats in a forced swimming test (FST) in a dose range of 30-125 mg/kg, indicating a possible antidepressant activity.

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6. Dar A. and Khatoon S., (1997b) studied the antidepressant property of hexane (F2) and aqueous (F5) fraction of Areca catechu fruit in mice by tail suspension test (TST), forced swim test (FST) and locomotion test. The effect of the aqueous ethanolic extract F1, F2 and F5 on the monoamine oxidase activity were determined in rat brain homogenates. The F2 and F5 fraction of A. catechu cause as clear and dose-dependent reduction in the duration of the immobility time using either TST or FST. The F1, F2 and F5 fraction inhibits monoamine oxidase (MAO) in rat brain homogenates and showing antidepressant like effects.

7. Dar A. et al., (1997a) reported that aqueous fractions of Areca catechu seem to be the most potent inhibitor of MAO and it effect is similar to that Clorgyline. The ethanolic caused a significant reduction in the immobility time without affecting the spontaneous motor activity suggesting it’s antidepressant activity.

8. Vadawa, R.K. and Singh, R.H. (1996) studied Bacopa monniera for antidepressant activity. Thirty six patient of cittoedvega via-a-vis anxiety neurosis were selected for the clinical study and were randomly divided into two groups. Extract of the drug Aindri (B. monniera) was administered both the groups in a dose of 1.5 gms representing 7.5 gms of dry crude extract daily for a period of four weeks. The trial treatment produced significant improvement in the level of depression and anxiety, mental fatigue rate and memory span. Aindri also showed improved learning behavior in albino rats. The standardized methanolic extract Bacopa monniera (bacoside A 38.0 ± 0.9) was showed comparable effective with the standard antidepressant drug imipramine (15 mg/kg, i.p.).

9. Sairam et al., (2002) reported that when Bacopa monniera extract is given in the doses of 20 and 40 mg/kg orally once daily for 5 days, it was observed to have significant antidepressant activity in forced swimming and learned helplessness model of depression and was comparable to that of imipramine.

10. Yunfeng, L. et al., (2000) studied that the possible mechanism of antidepressant effect of Bajitian oligosaccharide (MW-97). The PC12 cells were incubated with MW-97 in presence of corticosterones (2 × 10^{-4} moll/L) could protect PC12 cell from the lession done by corticosterone in a concentration dependent manner. It also has neuro-protective effects. Bajitian is a medicinal plant named Indian mulberry.
11. Vural K. et al., (1996) reported antidepressant and anxiolytic activity of two endemic Ballota species; *B. larandana* and *B. nigra*. It was found that both of these species showed antidepressant activity. *B. larandana* also showed anxiolytic activity. Antidepressant activity was also compared with that of diazepam.

12. Lohning, A. and Winterhoff, H. (2000) reported that *Cimicifuga racemosa* extract reduced immobility time of female mice significantly giving hints of an antidepressant activity in the tail suspension test. The mode of action of neurotransmitter levels were determined in striatum hippocampus and hypothalamus after a 21 days pretreatment period while no differences to controls were observed in hippocampus or hypothalamus. Significant changes in neurotransmitter concentration were measured in the striatum. The serotonin turnover to HIAA was significant reduced, an effect which could be caused by an inhibition of the enzyme MAO and aldehydehydrogenase. In addition the dopamine concentration was increased.

13. Almeide R,N. et al., (1999) has reported that ethanolic extract of the leaves of *C. sympodiatis* to potentiate the toxicity of pentylene-tetrazol in mice. Similar to the effect of Imipramine (IMI), the extract also reduced the immobility time in the forced swimming test. Further the extract also reverted cetalesy and ptosis induced by reserpine even though the reversal was not dose-dependent or to the same extent to that produced by IMI.

14. Komori T. et al., (1996a) investigated antidepressant affect of various odourants by forced swimming test. *Citrus fragrance/ lemon odour* significantly reduced total immobility time and potentates the imipramine-induced reduction of total immobility time in the test. This synergistic effect of lemon odour and imipramine was not due to lemon order decreasing the metabolism of imipramine. Lemon order decreased locomoter activity in the open field, suggesting its effect to differ from those of psycho-stimulation but to be similar to those antidepressants.

15. Komori T. et al., (1996b) also reported that the effect of citral, which is one of the main constituent of lemon odour, was as strong as those of lemon odour. The treatment with citrus fragrance normalized neuro-endocrine hormone level and immune function and was rather more effective than antidepressant.
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16. **Valli M. et al., (1991)** reported that *C. nitida* was long been used as mild stimulant, the nut extract containing a water soluble complex including caffeine and kolutine. It may counteract the sedative and depressive effects of the other anxiolytic components contained in the plant extract. *C. nitida* is the one of the component of Euphytose ® (a product), used as anxiolytic and antidepressant activity.

17. **Zu Z.F. et al., (2002)** reported that the aqueous extracts of *C. longa* when administered orally to the mice, elicit dose dependent relation of immobility reduction in the tail suspension and forced swimming test in mice.


19. **Baez D.H. et al., (1999)** reported that the species *G. nevadensis* is known as dictamo real. Xanthones were detected in dichloromethane and ethyl acetate extract and their fractions. Bellidifolin and desmethyl-bellidifolin were isolated, both have been reported as inhibitors of monoamine oxidase (MAO). The result of this study suggest that *G. nevadensis* could be possible antidepressant and anti-infection agent.

20. **Singh S.K. et al., (2003)** reported that two herbal drugs namely *Muccu pruriens* (Kapikacchu) and *Withania somnifera* (Aswagandha) were clinically tried in 15 cases of depressive illness for two to three months period with encouraging results showing notable symptomatic improvements, decrease with degree of depression and anxiety.

mean swimming time of mice which was statistically significant, suggesting a central nervous system stimulant and/or anti-stress activity (antidepressant).

22. Della L.R. et al., (1996) evaluated antidepressant activity of a ginseng extract or its fraction and/or two ginsenoside in behavioral despair test. The ginseng extract (33 mg/kg) showed the same effects as the reference antidepressant drug. Ginsanside Rg (2.2 mg/kg) to be the major component responsible for the activity of *P. ginseng* roots.

23. Takeda H. et al., (2002) reported that effects of a water extract of *Perilla Herba* and six fractions there from were evaluated in mice by forced swimming test. An oral administration of a water extract of *Perillae Herba* significantly reduced the duration of immobility as antidepressant substance.

24. Perez O.I et al., (1991) reported that the *P. spinosa* L. blackthorn, has been widely used in traditional medicine in Navarra (Spain). The therapeutic effects of *P. spinosa* have been mainly attributed to flowers, leaves and fruits. The effect of aqueous (PSA) and ethanolic (PSE) extract of *P. spinosa* fruits in different psychopharmacological test, in order to evaluate their possible activity on central nervous system. In behavioral despair in mice, PSA reduced significantly the mean time of duration immobility, whereas PSE was no effective in this test. Amitryptiline significantly increased the struggle time in mice.

25. Castiella E. et al., (1991) reported that in antagonism to reserpine, the treatment with PSA caused statistically significant antagonism of ptosis induced by reserpine. PSA and PSE also antagonized, but not significantly, akinesia and hypothermia. Result from these test shows that PSA appears to a pattern of antidepressant–like activity, being effective in all those test involving a possible serotonergic stimulation.

26. Cristina P. et al., (2004) reported that anti-trypanosoma cruzi activity of green tea catechins against two different developmental stages of *Trypanosoma cruzi*. An ethyl acetate fraction from *Camellia sinensis* green tea leaves, which contains most of the polyphenolic compounds and the maximal trypanocidal activity, was obtained by fractionation of the aqueous extract with organic solvents. The most active compounds were gallocatechin gallate and epigallocatechin gallate. The investigatore suggested that these compounds could be used to sterilize blood and, eventually, as therapeutic agents for Chagas' disease.
27. Aucamp J., et al., (1997) reported that liver enzyme, xanthine oxidase (XO) produces uric acid and reactive oxygen species (ROS) during the catabolism of purines. Excess of the former can lead to gout and of the latter to increased oxidative stress, mutagenesis and possibly cancer. Polyphenols are antioxidants, and it has been suggested that they can reduce oxidative stress by their antioxidant properties. The inhibition of XO by five tea catechins and two flavones. It suggests a new mechanism whereby tea drinking may prevent oxidative stress related diseases, e.g. atherosclerosis and cancer.

28. Yam T.S., et al., (1997) reported that aqueous extracts of teas (Camellia sinensis) of different types and from various sources inhibited a wide range of pathogenic bacteria, including methicillin-resistant Staphylococcus aureus. Tea extracts were bactericidal to staphylococci and Yersinia enterocolitica at well below ‘cup of tea’ concentrations. Activity was confined to one of four fractions obtained from a green tea extract by partition chromatography. Testing of pure tea compounds and closely related chemicals suggested that the antibacterial activity of extracts of green tea can be explained by its content of epigallocatechin, epigallocatechin gallate and epicatechin gallate. In black tea extracts, theaflavin and its gallates are additional antibacterially active components.

29. Sano M., et al., (1995) studied the antioxidant effects of diets containing 3% green or black tea leaf powder in the liver and kidney using the tissue slice-antioxidant evaluation method with two lipid peroxidation inducers. After 50 days on the diets, liver slices prepared from green and black tea-supplemented rats showed significant inhibitory effects against tert-butyl hydroperoxide-induced lipid peroxidation. The results demonstrated that dietary green and black tea had antioxidant effects on tissue lipid peroxidation ex vivo.

30. Vijaya K., et al., (1995) reported that antibacterial effect of compounds extracted from Camellia sinensis L. and the methanol extract of Euphorbia hirta L. were studied against dysentery causing Shigella spp. using the Vero cell line. Cytotoxicity studies of the extracts were performed using the cell line and the non-cytotoxic concentration of the extract was tested for antibacterial activity against the cytopathic dose of the pathogen. These extracts were found to be non-cytotoxic and effective antibacterial agents.

31. Kapadia G.J., et al., (1976) studied the carcinogenicity of Camellia sinensis (tea). Fourteen extracts and fractions from 6 plants were injected sc into NIH Black rats. The tannin fractions from Quercus falcata pagodaefolia, Diospyros virginiana, and Camellia sinensis were very

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active and produced tumors at the injection site in 66% or more of the treated animals. Tannin fractions from 3 other plants and total aqueous extracts from 5 to 6 tested plants were also tumorigenic rats. The induced tumors were malignant fibrous histiocytomas. The experiment indicated a possibility of induction of tumor in man by the tested plant materials.

32. Chan E.W.C., et al., (2007) determined the total phenolic content (TPC) and antioxidant activity (AOA) of methanol extracts of fresh tea leaves from a lowland plantation in Malaysia. AOA was determined by 1, 1-diphenyl-2-picrylhydrazyl (DPPH) free radical-scavenging ability, ferric-reducing antioxidant power (FRAP), and ferrous-ion chelating (FIC) ability. TPC and AOA were observed in following manner shoots > young leaves > mature leaves. TPC and AOA of lowland leaves were comparable to those of highland plants. A green tea produced by drying young leaves in a household microwave oven for 4 min showed significantly higher TPC and AOA than selected four commercial brands of green and black tea in present study.

33. Maniana R., et al., (2008) studied that methanol and 70% acetone (acetone:water, 70:30) extracts of F. bengalensis (aerial root) and F. racemosa (stem bark) for their antioxidant activity and radical scavenging capacity in comparison with Camellia sinensis (L.) O. Kuntz (green tea). Methanol extracts of green tea and F. bengalensis and 70% acetone extract of F. racemosa contained relatively higher levels of total phenolics than the other extracts. The antioxidant potential of the extracts were assessed by employing different in vitro assays such as reducing power assay, DPPH, ABTS and OH radical scavenging capacities, peroxidation inhibiting activity through linoleic acid emulsion system, antihemolytic assay by hydrogen peroxide induced method and metal ion chelating ability. All the extracts exhibited antioxidant activity against the linoleic acid emulsion system (34–38%). The potential of multiple antioxidant activity was evident as it possessed antihemolytic activity and metal ion chelating potency.

34. Claudia A., et al., (2008) determined total polyphenol content in twelve samples of eight brands of green and black tea according to the International Organization for Standardization method (ISO). The antioxidant capacity was determined by the ferric thiocyanate method (FTC) and the 1, 1-diphenyl-2-picrylhydrazyl (DPPH) free-radical scavenging assay. Green tea showed a higher polyphenol content than black tea. The antioxidant activities were well
correlated with the total polyphenol content \( r^2 = 0.9935 \) for the ferric thiocyanate method and \( r^2 = 0.9141 \) for the 1, 1-diphenyl-2-picrylhydrazyl free-radical scavenging assay).

35. **Gramza A. and Korczak Z., (2005)** studied the possible mechanism of antioxidant activity, antioxidant sections and potential antioxidant properties of tea polyphenols in different lipid systems and food products. Although research provides many promising examples, detailed studies are still needed to understand the benefits of tea polyphenols as food additives.

36. **Lee, I. P., et al., (1997)** examined the chemopreventive effects of green tea and coffee among cigarette smokers in 52 clinically healthy male subjects between 20–51 years of age. Sister-chromatid exchange (SCE) rates were significantly elevated in smokers (9.46 ± 0.46) vs. non-smokers (7.03 ± 0.33); however, the frequency of SCE in smokers who consumed green tea (7.94 ± 0.31) was comparable to that of non-smokers, implying that green tea can block the cigarette-induced increase in SCE frequency. Coffee, by contrast, did not exhibit a significant inhibitory effect on smoking-induced SCE.

37. **Sur, P., et al., (2001)** studied anti-inflammatory and *in vitro* antioxidant activity of two groups of saponins, TS-1 and TS-2, isolated from tea root extract (TRE). Both TS-1 and TS-2 inhibited carrageenan-induced paw oedema in rats. The antioxidant activity of these compounds was evaluated using the xanthine–xanthine oxidase system. The study indicated that the previously observed antitumour activity of TRE might be mediated through scavenging of free radicals by saponins and their antiinflammatory activity.

38. **Miller J.M.T (2001)** reported that tea leaves have direct bactericidal effect against Streptococcus mutans and S. sobrinus; prevention of bacterial adherence to teeth; inhibition of glucosyl transferase, thus limiting the biosynthesis of sticky glucan; inhibition of human and bacterial amylases. Studies in animal models show that these in-vitro effects can translate into caries prevention. A limited number of clinical trials in man suggest that regular tea drinking may reduce the incidence and severity of caries.

39. **Gomes A, et al., (1995)** investigated the effect of the hot water extract of black tea (Camellia sinensis (L.) O. Kuntze (Theaceae) on streptozotocin (STZ)-induced diabetes in rats. The extract significantly reduced the blood glucose level and was found to possess both preventive and curative effects on experimentally produced diabetes in rats. The study reveals that, like green tea, black tea also possesses antidiabetic activity.
40. Yoshikawa M., et al., (2005) reported that methanolic extract and its \( n \)-butanol-soluble fraction of flowers of the tea plant \( (\text{Camellia sinensis}) \) was found to suppress serum triglyceride elevation in olive oil-treated mice and showed anti-hyperlipidemic activities.

![Diagram of molecule]

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\begin{align*}
\text{floratheasaponin A (1)}: & \quad R^1 = H, R^2 = \text{Ac} \\
\text{floratheasaponin B (2)}: & \quad R^1 = \text{OH}, R^2 = \text{Ang} \\
\text{floratheasaponin C (3)}: & \quad R^1 = \text{OH}, R^2 = 2\text{ME}
\end{align*}
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41. Chattopadhyay P., et al., (2004) prepared methanol-water (1:1) extract of dried tea (\( \text{Camellia sinensis} \)) root and carried out the pharmacological studies. Extract was found to possess anti-inflammatory, analgesic and antipyretic activities. The saponins present in the extract may be responsible for these activities.

42. Sur P., et al., (2001) studied the anti-inflammatory and \textit{in vitro} antioxidant activity of two groups of saponins, TS-1 and TS-2, isolated from tea root extract. Both TS-1 and TS-2 inhibited carrageenan-induced paw oedema in rats. The antioxidant activity of these compounds was evaluated using the xanthine–xanthine oxidase system.

43. Maity S., et al., (1995) reported the effect of the hot water extract of black tea (\( \text{Camellia sinensis} \) (L.) O. Kuntze, Theaceae) on ulceration induced by various ulcerogens and by cold restraint stress (CRS) in albino rats. The observations suggest that the hot water extract of black tea possesses anti-ulcer activity, probably mediated through prostaglandins.

44. Okello E. J., et al., (2004) reported \textit{in vitro} anti-cholinesterase and \( \beta \)-secretase activities of \( \text{Camellia sinensis} \) L. extract (tea). Green and black tea inhibited human acetylcholinesterase (AChE) and human butyrylcholinesterase (BuChE).

45. Yoshikawa M., et al., (2008) reported that methanolic extract and 1-butanol-soluble portion (the saponin fraction) from the flower buds were found to exhibit potent inhibitory effects on ethanol- and indomethacin-induced gastric mucosal lesions in rats and on serum glucose elevation in sucrose-loaded rats. Among the constituents of the 1-butanol-soluble portion, floratheasapxonins A, B, and C showed gastroprotective and hypoglycemic activities.