Abstract

Anxiety is a CNS disorder and is a debilitating state of mind. Medications prescribed have enormous side effects such as somnolency, addiction liability, insomnia, memory impairment etc. Hence, herbal medicines are on the lookout owing to their safety and minimal adverse effects.

The herb under study is *Nardostachys jatamansi*, commonly referred to as Indian Spikenard. The 70% ethanolic extract of *Nardostachys jatamansi* (NJE) was explored for its potential anxiolytic effects and was effective in alleviating anxiety in mice when orally administered (250 mg/kg) for seven days and this dosage also enhanced brain GABA and monoamine neurotransmitters. Further, mode of anxiolytic actions of NJE, confirmed that they were primarily and plausibly mediated by activating GABAergic receptor complex. Additionally, NJE alleviated BSO induced OS via its antioxidant machinery and by modulating glyoxalase 1 and glutathione reductase 1, genes implicated in OS induced anxiety.

The pharmacokinetics studies showed that NJE had a elimination $t_{1/2}$ of 6.56 h, Vd of 2.014 mL, Ke of 0.105 h$^{-1}$ and total clearance of 0.212 mL/h. Its biodistribution revealed maximum accumulation in kidneys with little activity recorded from the brain (0.1 %). These metabolites of NJE crossing blood brain barrier were studied using UPLC/MS. It aided in identification of zacopride hydrochloride, gansongone, nardosinonediol, beta-ionone, kanshone A, B and E (all of which were identified in NJE by LC-MS). Zacopride hydrochloride is a 5-HT4 agonist and 5-HT3 antagonist and is attributed with anxiolytic properties. Beta-ionone has been shown to enhance the antioxidant status.

Further, with herbal additives of NJE a nutraceutical was developed and its physicochemical, microbiological and anxiolytic properties revealed that the drink had an overall acceptability of 7.8 and was shelf stable for 6 months and aided in diminution of anxiety evidenced by behavioural parameters and enhanced GABA and monoamine neurotransmitters.

These results suggest that the developed nutraceutical with herbal additives of *Nardostachys jatamansi* given in form of food might overcome or avoid drug dependency and it promises to attenuate anxiety and also provide general nutrition apart from relieving people of the stigma of consuming drugs.