Comparative and functional screening of three species traditionally used as antidepressants: *Valeriana officinalis* L., *Valeriana jatamansi* Jones ex Roxb. and *Nardostachys jatamansi* (D.Don) DC.

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Abstract: The essential oils (EOs) of three Caprifoliaceae species, the Eurasiatic *Valeriana officinalis* (Vo), the Himalayan *Valeriana jatamansi* (Vj) and *Nardostachys jatamansi* (Nj), are traditionally used to treat neurological disorders. Roots/rhizomes micromorphology, DNA barcoding and EOs phytochemical characterization were carried out, while biological effects on the nervous system were assessed by acetylcholinesterase (AChE) inhibitory activity and microelectrode arrays (MEA). Nj showed the highest inhibitory activity on AChE (IC_{50} 67.15 μg/mL) followed by Vo (IC_{50} 127.30 μg/mL) and Vj (IC_{50} 246.84 μg/mL). MEA analyses on rat cortical neurons, carried out by recording Mean Firing Rate (MFR) and Mean Bursting Rate (MBR), revealed stronger inhibition by Nj (IC_{50} 18.8 and 11.1 μg/mL) and Vo (16.5 and 22.5 μg/mL), compared with Vj (68.5 and 89.3 μg/mL). These results could be related to different EOs composition, since sesquiterpenes and monoterpenes significantly contribute to the observed effects, but the presence of oxygenated compounds such as aldehydes and ketones is a discriminating factor in determining the order of potency. Our multidisciplinary approach represents an important tool to avoid the adulteration of herbal drugs and permits the evaluation of the effectiveness of EOs that could be used for a wide range of therapeutic applications.

Keywords: Caprifoliaceae; Essential oil; Acetylcholinesterase; Neuroactive effects; MEA analyses; DNA barcoding; Micromorphology; Botanicals authentication.