Abstract

Tea (*Camellia sinensis*) having anti-inflammatory, antioxidant, and free radical scavenging properties, may be beneficial to prevent the symptoms of neurodegenerative disorders like Alzheimer's disease (AD). The therapeutic properties, however, dependent on the concentrations of various phytonutrients in fresh tea leaves, which is highly regulated by field level agronomical management. In this study, an attempt was made to compare the quality parameters of tea leaves grown under organic and inorganic nutrient management practices. The Anti-Alzheimer's effect of the tea leaves grown under different nutrient management practices on rat models of AD and the behavioural changes in AD patients were also investigated in this experiment. Field experiments using the productive tea clone (TV25) with four nutrient management treatments were conducted during 2015 to 2017 in the research farm of Agricultural and Food Engineering Department, Indian Institute of Technology Kharagpur. The four nutrient management treatments were no application of fertilizer (control), organic fertilizer (OF), inorganic fertilizer (IF), and integration of OF and IF. Tea leaf samples as two leaves and a bud were collected in three replications from all treatment plots in three different commercial harvest seasons (May, July, and September) for the quality analysis and animal feeding experiment of AD rats. The OF treatment resulted significantly higher Mg and total phenolics content, antioxidant capacity, and acetylcholinesterase inhibitory activity of tea leaves as compared to the IF and control treatments throughout the sampling season, July being the best. In animal experiment, administration of the organic teat extract to AD rats significantly lowered the Aβ-42 level to 49 ± 1.5 pg mg^{-1} from the value 84 ± 1.7 pg mg^{-1} in brain of untreated AD rats. The organic and integrated tea extract treatments showed greater α-secretase and free radical scavenging enzymatic activity in AD rats, which was comparable with Celecoxib treated rats. Feeding the organic tea extract to AD rats reduced the toxic Aβ-42 peptide (up to 41%), COX-2 (34%), malonaldehyde (50%), and nitrite (48%) level compared to untreated rats. Further, consumption of the organic tea improved the cognitive impairment in patients suffering from mild to moderate dementia due to AD. The results revealed the effectiveness of organic tea as a promising neuroprotective agent to prevent the AD.

Keywords: Alzheimer's disease, Antioxidant activity, Acetylcholinesterase activity, Aβ-42 level, Nutrient management, Organic tea.