conferenceseries.com

5th Global Summit on BRAIN DISORDERS AND THERAPEUTICS

February 08-09, 2024 | Madrid, Spain

Autonomic dysfunction in alzheimer's disease - insights from a computational model of the autonomic nervous system

Sajitha S

Cochin University of Science and Technology, India

Alzheimer's disease (AD) is a complex neurodegenerative disorder characterized by acetylcholine depletion and autonomic dysfunction. As cholinergic depletion and autonomic dysfunction have a common neurobiological basis, autonomic function assessment can help in diagnosis, dementia subtyping and assessment of AD. Autonomic dysfunction and AD severity are positively correlated. Heart rate variability (HRV) analysis allows for a non-invasive assessment of the autonomic function. To identify the autonomic function parameters that significantly vary in AD, a group of clinically plausible AD patients are compared with agroup of age and gender matched helthy controls. In patients with AD, there is a significant decrease in vagal activity, sympathovagal imbalance with a dominant sympathetic activity, and change in the time domain, frequency domain, and nonlinear HRV characteristics. In the present study a computational model of the Autonomic Nervous System (ANS) for HRV is used to simulate AD autonomic states. The model frame work is based on neurotransmitter kinetics, namely Acetylcholine and Norepinephrine. The model has the flexibility to suitably modulate the concentration of acetylcholine so as to represent various autonomic states corresponding to AD. By suitably controlling the concentration of acetylcholine concentration, ten different progressive states of AD are presented. The model offers a few parameters to fine tune the concentration of acetylcholine. As AD is a complex neurodegenerative case a multi-disciplinary approach may be useful to manage the disease. Mathematical models may be useful to get an insight into the neurophysiological alterations accompanying the disease, identify novel biomarkers, and design effective diagnostic tools.

Biography

Sajitha S graduated in Biomedical Engineering from Cochin University of Science and Technology and had M-Tech from Indian Institute of Technology, IIT Madras. She is currently pursuing Ph.D studies and working as Asst. Professor in Biomedical Engineering at Model Engineering College, Kochi, India. Her areas of interests include Computational modelling of physiological systems, Medical Imaging Techniques, and Biomechanics.