

**Notification No:** F.No.COE/Ph.D./(Notification)/5/13/2022

**Date of Award:** 17.05.2022

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**Topic of Research:** Sleep Disturbance-Induced Cognitive Impairment in Collegiates: Effects of Brain Wave Entrainment and Aerobic Exercise

### **Summary**

**Title:** Sleep Disturbance-Induced Cognitive Impairment in Collegiates: Effects of Brain Wave Entrainment and Aerobic Exercise

**Introduction:** Sleep disturbance is quite prevalent among students which leads to deleterious consequences on cognition. Considering the importance of slow wave activity (SWA) in enhancing sleep and cognitive functions, we investigated the effects of SWA interventions, i.e., cranial electrostimulation (CES) and aerobic exercise training (AET) on sleep and cognition in collegiates.

**Methods:** Forty-two collegiates with sleep disturbance (Pittsburgh sleep quality index >5) and cognitive impairment (Montreal cognitive assessment  $\leq 26$ ) were randomly allocated into three groups: CES (n= 14), AET (n= 14), control (n= 14). Pre and post 12 weeks of intervention, measures were taken for sleep using polysomnography, cognition using P300 and PennCNP, and biomarkers such as melatonin, cortisol and BDNF.

**Results:** CES led to significant changes in sleep latency, percentage of time spent in N1 and N3 sleep, sleep efficiency, P300 amplitude and latency, attention, executive function, melatonin and cortisol. AET significantly modulated sleep latency, percentage of time spent in N1 and N3 sleep, P300 amplitude, attention, executive function and melatonin.

**Conclusion:** Both SWA enhancements interventions for 12 weeks brought significant improvements in various outcome measures, CES demonstrated slightly superior outcomes than AET.