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Electroencephalographic assessment of cognitive function in medical students

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Electroencephalographic assessment of cognitive function in medical students: N400 appears as a negative peak in EEG 400 ms after reading incongruous sentences among congruous. It has clinical and linguistic significance. We aimed at investigating latency and amplitude of N400 in response to reading the English incongruous sentences with the purpose of establishing the test. In this experiment, consenting healthy medical students (n=33), silently read semantically congruous (30) and incongruous (20) English sentences displayed randomly at the rate of 300 ms/word. Reading the sentences and recording event related potential (ERP) were simultaneous. We analyzed 4000-ms long EEG epochs (2000 before and 2000 after the sentence endings) creating 2000 data-points (every 2 ms). The ERP amplitudes at each data-point were averaged separately for incongruous and congruous reading responses and analyzed using EDFbrowser. The averaged ERP amplitudes were compared between incongruous and congruous responses using paired t-test. Academic performance marks and questionnaire-based cognitive score were also documented. Across the electrode sites, statistically significant ERP N400 amplitudes (μV) latencies appeared between 416-498 ms in response to incongruous reading as compared to congruous [(-0.36±0.13 vs. 0.25±0.14, C3), (-0.21±0.18 vs. 0.23±0.11, C4), (-0.43±0.23 vs. 0.21±0.25, P3), (-0.33±0.2 vs. 0.37±0.15, P4), (-0.25±0.22 vs. 0.52±0.18, Fz), (-0.31±0.14 vs. 0.13±0.13, Cz), and (-0.24±0.2 vs. 0.29±0.15, Pz)]. The amplitudes were positively correlated with the academic performance (ranges of r=0.449-0.519, p=0.002-0.009) and with the cognitive score (ranges of r=0.351-0.493, and p=0.004-0.045). The N400 latency in Nepali (non-native English speaker) medical students ranged between 416-498 ms depending on brain sites.

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