

Thesis title	A Study on the Possibility of Brain Wave Frequency Analysis by Cerebral Function Monitor for Determination of Depth of Anesthesia
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Abstract

Many attempts have been made to monitor anesthetic depth with electroencephalography (EEG). However, EEG monitoring has several limitations namely size and complexity of equipments, special personel needed, including difficulties in recording and interpretation. So the application in monitoring have not been popular. Those difficulties decreased after the introduction of microprocessor in the last 1-2 decades. At present, an effort to use automated EEG processing for anesthetic depth monitoring is increasing because recording can be made easily and continuously for long periods.

The purpose of this research was to study the possibility of anesthetic depth monitoring by CFM in which the total mean amplitude and percentages of α , β , δ and θ frequency were displayed and updated every 6 seconds. The study was performed in 20 female patients, without neurological diseases. Electrodes used 1 pair of recording electrodes placed at P₃ and P₄ position and grounding eletrode at Fz according to international 10-20 system. All patients received nitrous oxide in oxygen as anesthetics.

Recordings were performed at 2 periods, anesthetized surgical stage and awaking stage 72 hrs after surgical operation was completed. Recordings were done in eye opened 4 minutes and eye closed 4 minutes.

All data, total mean amplitude and percentages α , β , δ and θ were analysed for mean and SD in both control and experimental conditions. The analysis were divided into 3 parts: (1) all data, (2) only 3 periods of 6 second data in the 1st, 7th and 13th second of each minute, and (3) only 6 seconds of each minute starting from 1st second.

One way ANOVA was used to analyse the differences among 3 parts of data. It was found that averages of mean amplitude in anesthetized surgical stage, eye opened and eye closed were 20.77, 37.72, and 31.52 μV respectively with statistically significant differences, $P= 0.0149, 0.493$ and 0.164 for data of part 1, 2 and 3 respectively.

The average of percentages of brain wave frequency (α , β , δ and θ) in experimental condition were $17.7 \pm 3.6, 54.7 \pm 11.7, 10.6 \pm 6.6$ and 16.9 ± 6.0 respectively. The average of percentages of brain wave frequency (α , β , δ and θ) in control conditions (eye opened) were $18.8 \pm 5.8, 57.0 \pm 15.8, 7.4 \pm 7.3$ and 16.6 ± 8.3 respectively. The average of percentages of brain wave frequency (α , β , δ and θ) in control conditions (eye closed) were $17.6 \pm 5.1, 55.9 \pm 16.8, 17.6 \pm 5.0,$ and 17.1 ± 8.7 respectively.

From this study, it was concluded that there were no statistically significant differences among percentages of brain wave frequencies, but there was difference in mean amplitude, so it has much possibility to use mean amplitude as anesthetic depth monitoring.