

# Effect of Mindfulness Meditation toward Improvement of Concentration based on Heart Rate Variability

## Abstract

Mindfulness meditation is a type of therapy for a psychological cure like depression and anxiety that can significantly increase peoples' ability to concentrate and focus. Thus, this paper describes the analysis of mindfulness meditation effect toward concentration study in term of heart rate variability (HRV) signal. A memory test is used as a medium to test the concentration level of 20 participants, and their performance of the electrocardiogram signal was recorded. Peaks detection method and Pan-Tompkin method are used to extract the features like PQRST peaks and R-R interval from the ECG signal. Then, the extracted ECG signal features are classified using KNN method for before and after meditation during the memory test. The result shows that the effect of mindfulness meditation can improve the performance of participants' concentration level. The highest accuracy, sensitivity and specificity performance is obtained from the combination of all six features (P, Q, R, S, T peaks, and R-R interval value), which is 84.58 %, 88.77% and 80.39%. The analysis of memory test produces higher memory test score (69.2%), lesser miss selection (60.8%) and shorter taken time to complete the memory test (2.268 minutes) after mindfulness meditation compared to before mindfulness meditation. The R-R interval value represents heart rate variability (HRV) is important to prove that most of the participants are more relax and can handle their stress better after doing mindfulness meditation.

## Keywords

Concentration; concentration; ECG; Mindfulness meditation; Mindfulness meditation; ECG; Peaks detection; Pan-tompkin; Pan-tompkin; Peaks detection