Evaluating the Effects of Traditional Persian Music on Nonlinear Parameters of HRV

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Background:

Music is a multi-level signal that stimulates the body by affecting on autonomic nervous system (ANS). It can induce different emotions based on various physiological response in the body. In this research, the effects of three types of traditional Persian music is investigated by considering comprehensive HRV signal processing approaches.

Method:

ECG signals of 22 female college students with the age of 20 to 25 (22.72 ± 2.52) were recorded in control (silence) and while listening to three kinds of traditional Persian music that evoke certain emotions (happiness, peacefulness and sadness). After extracting HRV signal, the nonlinear parameters of it were extracted. The parameters include approximate Entropy, normal descriptors of Poincare plot (SD1 and SD2), and GoM and CoM parameters which demonstrate the dynamic of HRV points in this phase space. The extracted features in three groups of music stimuli were compared with the controls and then *k*-nearest neighbor classifier used to distinguish different emotions induced by the different music.

Results:

The results show that the parameters of GoM and CoM have significant responses in different kinds of music stimuli. Among these three induced emotions, sadness resulted in the highest rate of accuracy (96.67%) in comparison with other emotional responses. Two types of peacefulness and happiness were identified with the accuracy 86.67% and 83.33% respectively.

Discussion:

In this study, three emotional classes, including happiness, peacefulness and sadness were induced by three kinds of traditional Persian music and the heart responses were identified completely from each other using *K*NN classifier. The results show that the traditional Persian music can induce sadness more powerful although heart responses show peacefulness and happiness, too.