

Stress during Pregnancy: Is the Autonomic Nervous System Influenced by Anxiety?

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Recently, there seems to be more and more interest in studying all kinds of emotions by means of physiological signals. It is known that stress influences the cardiac system which is regulated by the autonomic nervous system (ANS). The goal of this study was to investigate whether anxiety during pregnancy can be linked with a different autonomic heart rate modulation.

More than 100 pregnant women were included and underwent Holter ECG monitoring, cortisol measurements and the state trait anxiety inventory (STAI) questionnaire. Based on the STAI score, subjects belong to a low, medium or high anxious group. Also a mental stress test was applied during the recording. Heart rate variability (HRV) parameters were calculated as markers of ANS functioning, as well during day as night period and during the stress test. In addition to the standard time and frequency domain methods, also nonlinear parameters were used to describe self-similarity, complexity and chaotic signatures. Statistical analysis was obtained by the Kruskal-Wallis test and Spearman correlation coefficient r .

Heart rate was not affected ($r < 0.01$). Almost all HRV parameters were negatively correlated with STAI, meaning a reduced HRV with a higher anxiety level, though not statistically significant, except the chaos level ($r = -0.26$, $p = 0.021$). This negative correlation was more expressed during day than night time. Positive correlations were only found for parameters related to sympathetic activity (LFnu and LF/HF) and for the detrended fluctuation analysis (DFA) parameters. In contrast, the positive correlations were stronger at night compared to day time. Most of the significant between-group differences were found between the low and medium anxious groups. The groups did not react significantly differently on the mental stress test.

To conclude, the ANS modulation is slightly influenced by the anxiety level, but not as strongly as hypothesized before.