

Standard values and influencing factors for fetal acceleration and deceleration capacity: providing insights into the maturation of the fetal autonomic nervous system

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Background: Fetal heart rate variability is an indirect measurement of the fetal autonomic nervous system. Phase-rectified signal averaging is a new method of complex biological signal analysis. Its acceleration and deceleration capacity provides insights into the maturation of the fetal autonomic nervous system. The aims of this study were to determine standard values for average acceleration capacity (AAC) and deceleration capacity (ADC) in the third trimester of pregnancy and to investigate influencing factors on AAC and ADC.

Methods: Measurements of fetal heart activity by cardiotocography from 32nd to 40th week of gestation in uncomplicated pregnancies (n=149). Studied influencing factors were maternal age, gravidity, artificial insemination, BMI, ethnicity, medication intake (Mg, Fe, others), nicotine abuse, socioeconomic status. Outcome parameters were birth weight, gender, pH, Apgar-Score. AAC and ADC were determined by the means of Phase-rectified Signal Averaging (PRSA).

Results: No significant alterations in the sympathovagal balance were found from 32nd weeks of gestation until delivery. But significant decrease of AAC was found beyond the presumed date of birth indicating an impairment of the fetal autonomic nervous system (ANS). In addition, low birth weight was associated with an activation of the fetal autonomic nervous system and high maternal age was related to a reduced fetal heart rate variability.

Conclusion: In the presence of high maternal age, low birth weight or pregnancy beyond the presumed date of birth, influence on the fetal autonomic nervous system can be found. These mechanisms can have an influence on cardiovascular events.