

I S—67 A new method to determine a fractal dimension of nonstationary time-series data

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[Objective] An integrated and quartile analysis (IQA) was developed to determine a fractal dimension of nonstationary time series.

[Methods] Computer-simulated fractional Brownian series, whose fractal dimensions (D) ranged from 1.5 to 2.5 with a step of 0.1 were analyzed by the IQA and the spectral analysis (SA). In the IQA algorithm, the time series was first divided into boxes of equal length (n), and time series in each box were integrated. Next the quartile (Q(n)) of all integrated time series was calculated. This computation was repeated over all time scales (n). The IQA and the SA calculated two fractal scaling exponents (FSEs): a slope (A) of the line relating $\log F(n)$ to $\log n$ and a slope (B) of power spectral densities on log-log plane, respectively. [Results] The relation between D and two FSEs of fractional Brownian series satisfied two equations: $A=3-D$; $A=(1-B)/2$. The correlation coefficients of log-log plots using the IQA were significantly lower ($p<0.01$, by a paired t-test) than that by the SA. In same series with a short rectangle (sampling error), the FSEs calculated by the SA were significantly affected ($p<0.01$) but the IQA had no change. [Conclusion] Usefulness and robustness of the IQA to analyze nonstationary time series, such as fetal heart rate fluctuation, are demonstrated.

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Fetal acoustic stimulation test in the early intrapartum period as a predictor of perinatal outcome.

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Objective: To determine the relationship between fetal acoustic stimulation test (FAST) in the early intrapartum period and perinatal outcome

Methods: 307 singleton high risk pregnant women of at least 32 weeks gestation who were admitted in labour room, had FAST performed. All were in the latent phase of labour with cephalic presentation and intact membranes. The result of FAST was compared to the perinatal outcome.

Results: In 307 high risk pregnancies, the prevalence of poor perinatal outcome was 9.7%. When compared to the perinatal outcome, the FAST had sensitivity 63.3%, specificity 96.4%, positive predictive value 65.5%, negative predictive value 96.0%, and accuracy 93.1%.

Conclusion: The finding suggested that the usefulness of FAST as an effective screening test to identify fetus at risk in early intrapartum period. This is a simple and convenient test for rapid assessment of fetal well-being.