

# FETAL ELECTROCARDIOGRAM (ECG) FOR FETAL MONITORING DURING LABOUR.

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## ABSTRACT

### BACKGROUND:

Hypoxaemia during labour can alter the shape of the fetal electrocardiogram (ECG) waveform, notably the relation of the PR to RR intervals, and elevation or depression of the ST segment. Technical systems have therefore been developed to monitor the fetal ECG during labour as an adjunct to continuous electronic fetal heart rate monitoring with the aim of improving fetal outcome and minimising unnecessary obstetric interference.

### OBJECTIVES:

To compare the effects of analysis of fetal ECG waveforms during labour with alternative methods of fetal monitoring.

### SEARCH METHODS:

The Cochrane Pregnancy and Childbirth Group's Trials Register (latest search 23 September 2015) and reference lists of retrieved studies.

### SELECTION CRITERIA:

Randomised trials comparing fetal ECG waveform analysis with alternative methods of fetal monitoring during labour.

### DATA COLLECTION AND ANALYSIS:

One review author independently assessed trials for inclusion and risk of bias, extracted data and checked them for accuracy. One review author assessed the quality of the evidence using the GRADE approach.

### MAIN RESULTS:

Seven trials (27,403 women) were included: six trials of ST waveform analysis (26,446 women) and one trial of PR interval analysis (957 women). The trials were generally at low risk of bias for most domains and the quality of evidence for ST waveform analysis trials was graded moderate to high. In comparison to continuous electronic fetal heart rate monitoring alone, the use of adjunctive ST waveform analysis made no obvious difference to primary outcomes: births by caesarean section (risk ratio (RR) 1.02, 95% confidence interval (CI) 0.96 to 1.08; six trials, 26,446 women; high quality evidence); the number of babies with severe metabolic acidosis at birth (cord arterial pH less than 7.05 and base deficit greater than 12 mmol/L) (average RR 0.72, 95% CI 0.43 to 1.20; six trials, 25,682 babies; moderate quality

evidence); or babies with neonatal encephalopathy (RR 0.61, 95% CI 0.30 to 1.22; six trials, 26,410 babies; high quality evidence). There were, however, on average fewer fetal scalp samples taken during labour (average RR 0.61, 95% CI 0.41 to 0.91; four trials, 9671 babies; high quality evidence) although the findings were heterogeneous and there were no data from the largest trial (from the USA). There were marginally fewer operative vaginal births (RR 0.92, 95% CI 0.86 to 0.99; six trials, 26,446 women); but no obvious difference in the number of babies with low Apgar scores at five minutes or babies requiring neonatal intubation, or babies requiring admission to the special care unit (RR 0.96, 95% CI 0.89 to 1.04, six trials, 26,410 babies; high quality evidence). There was little evidence that monitoring by PR interval analysis conveyed any benefit of any sort.

#### **AUTHORS' CONCLUSIONS:**

The modest benefits of fewer fetal scalp samplings during labour (in settings in which this procedure is performed) and fewer instrumental vaginal births have to be considered against the disadvantages of needing to use an internal scalp electrode, after membrane rupture, for ECG waveform recordings. We found little strong evidence that ST waveform analysis had an effect on the primary outcome measures in this systematic review. There was a lack of evidence showing that PR interval analysis improved any outcomes; and a larger future trial may possibly demonstrate beneficial effects. There is little information about the value of fetal ECG waveform monitoring in preterm fetuses in labour. Information about long-term development of the babies included in the trials would be valuable.