HAPI Trial: Haemodynamic Assessment Using Perfusion Index in Well Babies – How Low Is 'Low'?

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Background

Peripheral Perfusion Index (PPI), is derived from photoelectric pleythysmographic signal of pulse oximetry as a ratio of pulsatile to non pulsatile blood flow and has been utilised for assessment of patients. Although normal variability of PPI has not been well established, a PI value of ≤1.24 has been suggested to be a predictor for severe illness in neonates.

Objective

We aim to establish a normative data on PPI in well newborn infants born between 35 to 42 weeks gestation and ascertain its variability with gestation at birth, time of examination, birth weight, oxygen saturation (SpO2) and heart rate (HR).

Design/Methods

A prospective study was carried out at University Hospital of North Tees in North East England between January - November 2012. Research ethics committee and hospital research board approval was obtained before commencing the study. Masimo SET Radical 7 pulse oximeter® (Masimo Corp., Irvine, Calif., USA) was used to record PPI and pulse oximetry values using a non-disposable sensor placed on either foot at routine postnatal discharge examination. PPI was documented when SpO2 was more than 95%. Infants with O2 saturation less than 95% were evaluated for cardio respiratory disorders and were excluded from the study. SPSS version 19® was used for data analysis.

Results

Complete data on 1073 infants was available for analysis. Our study suggests a 'low' PPI defined as <0.75 (10^{th} centile) or <0.54 (3^{rd} centile). Using ANOVA and regression analysis, time of examination (up to 7 days), gestation, birth weight and heart rate did not affect the observed PPI. PPI was observed to decrease with increasing SpO2.

PPI centile cut off (N= 1073)	
3rd centile	0.54
10th centile	0.75
25th centile	1.00
50th centile	1.50
75th centile	2.30
91st centile	3.33
99th centile	5.57

PPI variability with birth weight (grams)	
Birth weight	Mean (SD)
<2000	2.19 (1.24)
2001-2500	1.61(1.05)
2501-3000	1.71 (1.15)
3001-3500	1.72(0.99)
3501-4000	1.83 (1.15)

PPI variability with birth weight (grams)	
>4000	1.88 (1.16)

Conclusions

In well newborn babies of 35-42 weeks gestation:1. PPI measurement is independent of the time of examination, gestation, birth weight and HR. 2. A PPI value <0.75 (10^{th} centile) or <0.54 (3^{rd} centile) could be interpreted as 'low' and utilised for haemodynamic assessment. 3. SpO2 values can affect observed PPI values. Further trials are required to study the predictive value of 'low' PPI in different disease states.