

Interactions among Peripheral Perfusion, Cardiac Activity, Oxygen Saturation, Thermal Profile and Body Position in Growing Low Birth Weight Infants.

Sahni R., Schulze K.F., Ohira-Kist K., Kashyap S., Myers M.M., Fifer W.P. *Acta Paediatr.* 2010 Jan;99(1):135-9

Abstract

AIMS: To investigate the correlation between the 'perfusion index' (PI) and other commonly used estimates of cutaneous blood flow [heart rate (HR), surface temperatures (ST) and central-to-peripheral thermal gradients (C-P grad)] and to use this new non-invasive tool to compare differences between prone and supine sleep position in low birth weight (LBW) infants.

Methods

Six-hour continuous recordings of pulse oximetry, cardiac activity and absolute ST from three sites (flank, forearm and leg), along with minute-to-minute assessment of behavioural states were performed in 31 LBW infants. Infants were randomly assigned to the prone or supine position for the first 3 h and then reversed for the second 3 h. PI data were correlated with HR and C-P grad, and compared across sleep positions during quiet sleep (QS) and active sleep (AS).

Results

Perfusion index correlated significantly with HR ($r(2) = 0.40$) and flank-to-forearm thermal gradient ($r(2) = 0.28$). In the prone position during QS, infants exhibited higher PI (3.7 ± 0.9 vs. 3.1 ± 0.7), HR (158.4 ± 8.9 vs. 154.1 ± 8.8 bpm), SpO₂ (95.8 ± 2.6 vs. $95.2 \pm 2.6\%$), flank (36.7 ± 0.4 vs. 36.5 ± 0.4 degrees C), forearm (36.1 ± 0.6 vs. 35.5 ± 0.4 degrees C) and leg (35.4 ± 0.7 vs. 34.7 ± 0.7 degrees C) temperatures and narrower flank-to-forearm (0.6 ± 0.4 vs. 0.9 ± 0.3 degrees C) and flank-to-leg (1.3 ± 0.6 vs. 1.8 ± 0.7 degrees C) gradients, compared to those of the supine position. Similar differences were observed during AS.

Conclusion

Perfusion index is a good non-invasive estimate of tissue perfusion. Prone sleeping position is associated with a higher PI, possibly reflecting thermoregulatory adjustments in cardiovascular control. The effects of these position-related changes may have important implications for the increased risk for sudden infant death syndrome in prone position.