

# USE OF NEAR-INFRARED SPECTROSCOPY IN CEREBRAL OXYGENATION MONITORING IN FULL TERM NEONATES DURING TRANSITION AFTER BIRTH

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## INTRODUCTION

Transition from fetal to extrauterine life is a complex physiological process. During this process assessment of vital parameters is recommended using pulse oximetry and cardiac monitoring. This approach does not include monitoring of the brain, which is one of the most vulnerable organs in regard to hypoxia. Various monitoring strategies have been employed during the initial postnatal transition throughout the previous few decades. These monitoring tool include, doppler sonography of cerebral blood vessels, amplitude integrated aEEG of cerebral activity and near infrared spectroscopy for monitoring cerebral oxygenation. Near-infrared spectroscopy allows for noninvasive, continuous monitoring of regional tissue oxygenation ( rSO<sub>2</sub>) of different body organs .Regional cerebral oxygenation represents a combination of arterial, capillary and venous perfusion saturation and the proportion is supposed to be 25:75. As a result, this value is closer to venous oxygen saturation than arterial oxygen saturation (SpO<sub>2</sub>) measured by pulse oximetry.

## Aim of the work

The aim of the study was to assess the values of cerebral oxygenation in the fullterm neonates in the first 10 minutes of life and to compare these values between neonates delivered by normal vaginal delivery and those delivered by elective cesarean section.

## METHODS

Prospective cohort study includes healthy fullterm newborns  $\geq 38$  weeks born through normal vaginal delivery or elective cesarean section from January 2021 till June 2021 in the delivery rooms of Alexandria University Maternity Hospital (AUMH).

Collected data included: Demographic date, perinatal history, antenatal history including the mode of deliver, resuscitation and APGAR score. Also, crSO<sub>2</sub>, cerebral fractional tissue extraction (cFTOE) and spO<sub>2</sub> readings at 1,5 and 10 minutes of life. Umbilical blood gas was sampled for all cases.

## RESULTS

The present study was held at delivery rooms of the Alexandria University Maternity Hospital (AUMH) from January 2021 till June 2021. Sixty full term newborns were enrolled in this study. They were divided into 2 groups; group born through cesarean section (30 full term newborn) and group vaginally delivered (30 full term newborn).

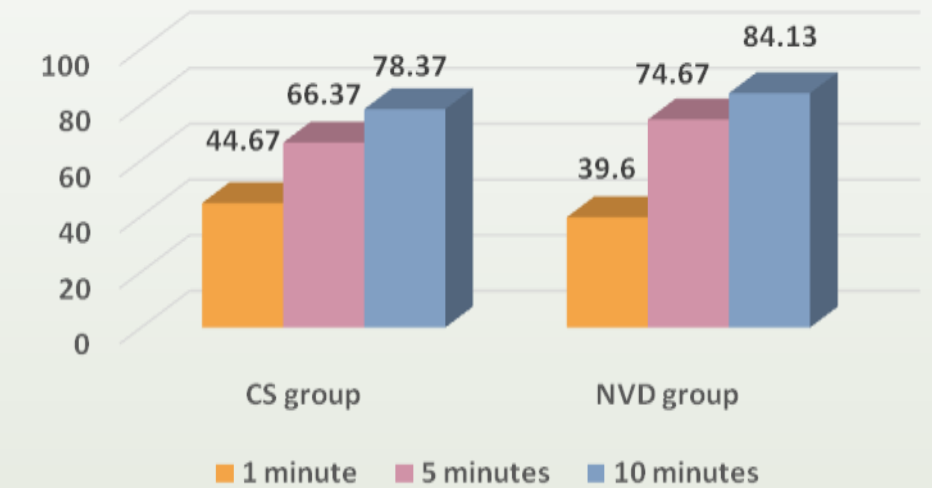
**Table 1:** shows that the crSO<sub>2</sub> is significantly higher among the normal vaginal group at 5 and 10 minutes of life while at the first minute of life.

**Regional cerebral oxygenation (crSO<sub>2</sub>) difference between the two studied groups:**

	Mode of delivery		Test of Sig.	p
	Cs	NVD		
<b>CrSO<sub>2</sub> 1min</b>				
Min. – Max.	15.00 – 70.00	15.00 – 78.00	t= 1.260	0.213
Mean $\pm$ SD.	44.67 $\pm$ 13.60	39.60 $\pm$ 17.33		
Median (IQR)	45.00 (35.00 – 55.00)	39.50 (26.00 – 48.00)		
<b>CrSO<sub>2</sub> 5min</b>				
Min. – Max.	41.00 – 86.00	52.00 – 85.00	U= 229.5*	0.001*
Mean $\pm$ SD.	66.37 $\pm$ 10.35	74.67 $\pm$ 9.11		
Median (IQR)	67.00 (57.00 – 74.00)	80.00 (67.00 – 81.00)		
<b>CrSO<sub>2</sub> 10min</b>				
Min. – Max.	60.00 – 89.00	67.00 – 91.00	U= 219.5*	0.001*
Mean $\pm$ SD.	78.37 $\pm$ 7.39	84.13 $\pm$ 5.81		
Median (IQR)	80.00 (74.00 – 82.00)	85.50 (84.00 – 88.00)		

U: Mann Whitney test

p: p-value for comparing between the two studied groups



**Figure 1: Regional cerebral oxygenation (crSO<sub>2</sub>) difference between the two studied groups**

Figure (1) shows the difference in crSO<sub>2</sub> between the two studied groups. crSO<sub>2</sub> is significantly higher among the normal vaginal group at 5 and 10 minutes of life while at the first minute of life there is no statically significant difference

## CONCLUSION

Routine monitoring of the heart rate and SpO through pulse oximeter does not provide information about cerebral perfusion or oxygenation. Combined SpO<sub>2</sub> monitoring by pulse oximeter and crSO<sub>2</sub> monitoring by NIRS during neonatal transition can guide supplemental oxygen delivery and respiratory support to maintain adequate cerebral oxygen delivery and avoid cerebral hypo-or hyperoxygenation. Near infrared spectroscopy parameters as crSO<sub>2</sub> and cFTOE reach the plateau earlier than peripheral SpO<sub>2</sub> indicating the preferential oxygen delivery to the brain during the first minutes after birth.