OXYGEN SATURATION TRENDS IN NORMAL HEALTHY TERM NEWBORNS: NORMAL VAGINAL DELIVERY VS. ELECTIVE CESAREAN SECTION

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BACKGROUND

- Pregnancy is a physiological phenomenon, which is associated with pain, fear, anxiety, and even fear of death for mothers.
- According to World Health Organization (WHO), C-section rate was reported as 15% in 1985. Based on the reports of WHO in 2009, this rate has significantly increased, worldwide.
- Approximately 5% and 10% of newborns require some form of resuscitation every years
- There is enough evidence to suggest that unnecessary oxygen supplementation at the start of resuscitation may be harmful since oxygen free radicals may play a role in the pathogenesis of many neonatal diseases.

VAGINAL DELIVERY VS CESAREAN DELIVERY

Vaginal Delivery

Introduced to Vaginal Microbes: Lactobacillus

Normal Introduction of Gut Microbes

Normal Development of the Immune System
•Production of specific cytokines for proper immune system development

Richardson; 2013

VS.

Cesarean Delivery

Introduced to Skin Flora: Staphylococcus

Abnormal Microbial Introduction

Disrupted Intestinal Microbial Colonization
•Increase risk for Atopic Diseases, Asthma, Allergic Rhinitis, and Celiac Disease
•Association: Delayed Onset of Lactation
•Lack Breast Milk Support for Gut Flora

OBJECTIVE

- ***To study the normal oxygen saturation trends and fetomaternal correlates in healthy term newborns within 30 min of life born by normal vaginal delivery (NVD) and elective cesarean section (CS)***

METHODOLOGY

Place of study	**Department of Pediatrics at a tertiary care centre of Northern India over a 1-year period**
Study Design	Cross-sectional observational study
Study Period	January 2013–December 2013
Study population	200 healthy term newborns (NVD =100, CS = 100)

A written informed consent was taken from the parents of the newborns before enrolment.

All were given routine care as per the standard Neonatal Resuscitation Program (NRP) (2015) protocol (temperature 36.5–37.5°C).

As baby was born, the newborn was wiped with a pre-warmed cloth and observed for cry and vitals.

An SpO2 pulse oximeter probe was applied continuously to the right palm after thorough wiping and serial recording of pre-ductal SaO2 was carried out at intervals of 5, 10, 15, 20, 25 and 30 min after birth.

RESULTS

DEMOGRAPHIC OBSERVATION

- Among 200 newborns (100 = NVD and 100 = CS) of which 96 (48%) were female and 104 (52%) male, were enrolled in the study
- The mean birth weight of 2.86 kg (±0.43), gestation age 37–42 weeks
- The mean maternal hemoglobin level was 10.5 mg/ dL (±1.22); 84% of the mothers had no history of abortion, 38% were bipara, 34% were nulliparous and 0.1% were primipara.
- In the CS group, 98% received spinal and 2% received general anaesthesia.

- NVD = Normal Vaginal Delivery
- CS = Cesarean Section

SPO2 levels at different intervals in newborns within 30 min of birth, born by NVD and LSCS.

SpO_2 levels	NVD		LSCS		P-value
	Mean	SD	Mean	SD	
5th min	86.6	6.13	84.1	5.55	0.003
10th min	91.8	5.11	89.9	4.48	0.005
15th min	95.03	3.60	93.1	3.80	0.000
20th min	96.3	3.06	95.05	3.69	0.008
25th min	97.2	2.30	96.3	2.67	0.012
30th min	97.9	1.89	96.9	2.2	0.001

- *These results showed significantly higher mean SpO2 was observed in newborns born by NVD compared to by CS at different time intervals up to 30 min after birth.*
- *Moreover, the higher mean SpO2 was observed in female compared to male newborns in NVD, whereas no association was observed in the CS group*

CORRELATION BETWEEN SPO2 AT 10 MIN AND VARIOUS FETOMATERNAL VARIABLES

Variables	Mean	SD	r	R^2	P-value
Birth weight	2.86	0.43	−0.125	0.016	0.04
Gestational age	38.6	1.1	0.023	0.001	0.37
Apgar score at 10 min	8.9	0.18	0.33	0.109	0.001
Maternal Hb	10.5	1.2	−0.15	0.02	0.017
Parity	1.45	1.28	0.03	0.001	0.62
Abortion	0.26	0.66	0.035	0.001	0.62

- *This study showed a strong positive correlation between SpO2 and Apgar score at 10 min of life (r = 0.33) and a negative correlation with birth weight (r = −0.12) and maternal Hb (r = −0.15)*

DISCUSSION

- This study reported the mean SpO2 levels in healthy term newborns irrespective of mode of delivery within 30 min of life as 85.4%, 90.8%, 94.05%, 95.7%, 96.7% and 97.4% at 5, 10, 15, 20, 25 and 30 min of life, respectively.
- They compared their finding of SpO2 values of newborns with those of NRP 2015 by AAP and found values similar to their study at the 5th and 10th min.
- These results are consistent with the finding by Tiwari et al., who reported that infants born by CS have lower SpO2 values compared with those born through vaginal delivery and take a longer time to attain SpO2 values of more than 85%.

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- A similar study conducted by Hulsoore et al. and suggested that there was no significant difference in the SpO2 levels between NVD and CS. Moreover, they revealed that there is strong positive correlation between Apgar score and SpO2.

CONCLUSION

- This study defines normal SpO2 levels in healthy term newborns of NVD and elective CS, which can be used as reference standards for titration of oxygen therapy during neonatal resuscitations
- In addition, study also reported that geographic and racial differences do not influence much on the SPO2 levels in newborns immediately after birth
- Moreover, healthy neonates are poorly saturated immediately after birth and gradually reach 90%; therefore, oxygen supplementation is not required immediately after birth if the newborn is in good clinical condition
- In healthy newborns, levels of SpO2 measured at 10 min was inversely related to birth weight and maternal anemia

THANK YOU