ORIGINAL ARTICLE OPEN ACCESS

Effect of Early Versus Delayed Umbilical Cord Clamping On Neonatal Hemoglobin

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ABSTRACT

Objective — *To Compare the effect of early cord clamping (ECC) versus delayed cord clamping (DCC) on hemoglobin level at 6-hours after delivery on term neonates.*

Study design — *A cross sectional study.*

Place & Duration of study — *Department of Obstetrics and Gynaecology, Sir Syed Hospital Karachi, from July 2021 to January 2022.*

Methods — *Booked pregnant women who fulfilled the inclusion criteria were assigned into two groups of 30 each by random sampling. In group A cord was clamped at or <15 seconds (ECC) and in group B at 60 seconds (DCC) after delivery. Neonatal haemoglobin was evaluated at 6-hours after birth. For statistical significance student t test was applied. A p-value of <0.05 was considered as significant.*

Results — *A total of 60 pregnant women were included, 30 in ECC group A and 30 in DCC group B. The women in both the groups were comparable in terms of their age, parity, gestational age and hemoglobin levels. The mean age of group A women was 25.9+4.9 years and group B women 28.4+4.7 years. The neonatal haemoglobin was compared in two groups and the statistical difference was found significant (p=<0.001) in favour of group B.*

Conclusion — *Delayed cord clamping at birth increases the neonatal hemoglobin within a physiologic range and this intervention seems to increase the iron stores and reduce the rate of neonatal anemia.*

Key words — *Early cord clamping, Delayed cord clamping, Neonatal hemoglobin, Neonatal anemia.*

INTRODUCTION:

The World Health Organization (WHO) defines delayed cord clamping as happening between one and three minutes after delivery or when the cord ceases to pulse.[1,2] Early cord clamping is defined as clamping the umbilical cord within the first sixty seconds of birth. WHO Basic Newborn Resuscitation Guidelines of 2012 emphasize that early cord clamping is only justified when a baby is asphyxiated and requires immediate resuscitation.[3,4] In normal cases, delayed cord clamping along-with resuscitation has been found to be more appropriate for asphyxiated newborns, compared to immediate cord clamping.

Delayed cord clamping leads to a better newborn outcome, with no adverse effects, whether performed in term or preterm babies.[5] The benefits of DCC include increased hematocrit levels and reduction in mortality. Lower rate of intravascular hemorrhage, decreased need for surfactant therapy, improved cerebral oxygenation, increased pulmonary blood flow are also documented.[6,7] This study was conducted to find the effect of ECC versus DCC on neonatal outcome in terms of hemoglobin level six hours after birth to provide an evidence based data

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for the practicing obstetricians, other doctors and trained lady health workers rendering the maternity services.

METHODS:

Study design, place & duration: This comparative cross sectional study was conducted in the Department of Obstetrics and Gynaecology Sir Syed Teaching Hospital Karachi, from July 2021 to January 2022.

Ethical considerations: The study was approved by Ethical Review Board letter No.020SSCMS-Ethics/2021 dated 24-12-2021 and informed consent was taken.

Inclusion criteria and exclusion criteria: Term pregnancy (37 - 42 weeks by first trimester scan), singleton pregnancy confirmed on ultrasound, maternal hemoglobin >10.0gm/dl in booked cases were the inclusion criteria. Preterm pregnancy, multiple pregnancy, recent blood transfusion, maternal medical disorders during pregnancy (hypertension, diabetes mellitus, jaundice) and IUGR fetuses, were excluded. Similarly, babies, with poor Apgar score at one minute, grade 2 or 3 meconium staining of liquor, were not enrolled. The sample remained representative of the target population, with careful participant selection ensuring diversity and validity.

Sample size estimation: The calculated sample size for this study was approximately 70, based on the target population of pregnant women visiting the hospital. However, the actual sample size achieved was 60. This minor deviation was justified by considering practical constraints such as resource limitations, recruitment challenges, and time restrictions. Additionally, the difference falls within an acceptable margin of error and was unlikely to significantly impact the reliability of data and statistical power.

Study protocol: A non-probability purposive sampling technique was used to enrol pregnant women. Sixty booked women were included. They were assigned into two groups. In group A cord was clamped at or <15 seconds of birth (ECC), and in group B cord was clamped at 60 seconds (DCC) after delivery. Equal number of pregnant women was assigned into each group in 1:1 ratio. Neonatal hemoglobin was evaluated at 6-hours after birth. It was partially blinded study, as pediatricians and laboratory staff were not aware of the groups to which the sample belonged. Maternal and fetal data were entered into a pre-designed form.

Statistical analysis: The variables studied included maternal age, parity, maternal weight and maternal hemoglobin. These were expressed as mean and standard deviations. Outcome variable, the neonatal hemoglobin was compared between the two groups by applying Student t test. A p-value of <0.05 was considered significant.

RESULTS:

Sixty pregnant women were enrolled in the current study. They were equally divided (n=30 each) between group A (ECC) and group B (DCC). The age, parity, gestational age and hemoglobin levels were not statistically different between the groups (table I). The neonatal hemoglobin measured between the two groups six hours after birth is given in table II. It was statistically significant (p=<0.001). There was no higher risk of postpartum hemorrhage, increased blood loss during delivery, or requirement for blood transfusion in women enrolled in the study.

DISCUSSION:

In this study the effect of delayed umbilical cord

Table I: Baseline Data of Pregnant Women

Variables	ECC group n=30	DCC group n=30	p-value
Maternal age (years)	25.9 + 4.9	28.4 + 4.7	0.098
Gestational age (weeks)	38.9 + 1.03	38.8 + 1.09	0.809
Hemoglobin of mother	11.20 + 0.64	10.92 + 0.44	0.047
Parity	1.26 + 1.04	2.1 + 1.21	0.006

Table II: Comparison of Neonatal Hemoglobin Between The Groups 6-Hours After Birth

Groups	Neonatal weight (Gm)	Neonatal hemoglobin (gm/dl)
Group A	2882.31	16.29
Group B	2930 0.31	18.94 1.35
p - value	0.552	0.001*

clamping on neonatal hemoglobin compared to early cord clamping resulted higher mean hemoglobin levels 6-hours after delivery that was significant in favour of former approach. A significant improvement in neonatal parameters have been linked to better neurodevelopmental outcomes in children up to four years of age.[8-11]

Early cord clamping has been linked to various negative outcomes for the newborns, including hypoxia, infections, delayed psychomotor development, and anemia. The Ministry of Health of Tanzania reported that 43 out of every 1,000 infants died within the first year of life, with 25 out of 1,000 neonatal deaths due to birth asphyxia and 58% of children under five years suffered from anemia.[12] These findings suggest that delayed cord clamping reduces these adverse outcomes and promote healthier start in life. However, delayed cord clamping is less often practiced.[13] This study dispelled such perceptions. Similar results were reported in a study by Saba et al.[14] They found a significantly higher hemoglobin level at 24-hours in DCC group.

In our study mean age of the patients was 25.9+4.9 years in group A and 28.4+4.7 years in group B. The study of Ceriani-Carnadas et al reported the mean age of patients as 28.8+5.7 years in early clamping group and 28.6+6.1 years in delayed clamping group which is comparable with our study.[15] Mean gestational age was also comparable with the same study. A randomized study conducted by Purisch et al compared ECC 60 seconds after birth in cesarean delivery with DCC. They also concluded that mean hemoglobin level was higher in DCC compared to ECC group.[16] Similar results were found in studies from other parts of the world.

The results of our study also favoured delayed cord clamping which was found safe and simple method without increasing any undue risk to the pregnant women like PPH, intrapartum hemorrhage, and to newborns. The requirement of blood transfusion to mother was also not increased. It is therefore suggested to add this approach as unified protocol that aims to reduce iron deficiency anemia in infants especially in the developing countries.

Limitations of the study: The sample size was small but remained between the margin of error. The study was conducted in an urban setting. Similar studies in places with diverse background and socioeconomic strata may provide a more robust data for this approach of cord clamping at birth.

CONCLUSION:

The delayed cord clamping approach improved the neonatal hemoglobin and iron storage without harming pregnant women. This may reduce iron deficiency anemia during the first year of life.

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Received for publication: 26-02-2025
Sent for revision: 07-04-2025
Accepted after revision: 12-04-2025

Authors' contributions:
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Ethics statement: Approval was taken from the institution review board (IRB) before conducting the study and informed consent was obtained.

Competing interest: None declared.

Source of funding: Nil

Disclosure: None

Data availability: Corresponding author may provide data on request.

Use of artificial intelligence AI app was not used.

How to cite this article?
Nasir F, Naqvi S, Zulfiqar B, Saba N, Noorani MB. Effect of early versus delayed umbilical cord clamping on neonatal hemoglobin. J Surg Pakistan. 2024;29(4):106-10.