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EARLY VERSUS DELAYED CORD CLAMPING EFFECT ON NEONATAL HEMATOLOGICAL PARAMETERS

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Abstract

Background:
The umbilical cord is the lifeline that connects the placenta to the fetus. Early cord clamping and cutting of the umbilical cord is widely practiced as part of the management of labor. New studies have suggested delayed cord clamping with its potential benefits of improved iron status, hemoglobin, reduced need for blood transfusion

Objective:
To compare the effect of early cord clamping versus delayed cord clamping in term of mean hematological parameters at 24 hours, 48 hours and 3 months of age.

Study design:
Randomized Controlled Trial.

Setting:
Department of Obstetrics and Department of Neonatology, PAEC General Hospital, Islamabad.

Study Duration:
18-Sep-2020 to 17-Mar-2021.

Patients and Methods:
A total of 98 patients with full term pregnancy with 37 to 41 weeks of gestation were included in this study. Eligible mothers admitted in the maternity hospital were randomized just before delivery into Group-1 (Early cord clamping group) or Group-2 (Delayed cord clamping group) and their Hemoglobin measured. After delivery, umbilical cord was clamped and cut 2-3 cm distance from the umbilical stump either within 30 seconds after delivery or at 3 minutes depending on the group. At 24 and 48 hours of life 1 ml of venous sample was obtained from the baby for estimation of haemoglobin and hematocrit. On follow up at 3 months of age, haemoglobin, hematocrit and serum ferritin were estimated again.

Results:
Mean gestational age was 39.08±1.32 weeks in group I and 39.86±1.32 weeks in group II, p-value 0.006. There were 27 (55.10%) male babies in group I versus 29 (59.20%) male babies in group II, while there were 22 (44.90%) female babies in group I and 20 (40.80%) female babies in group II (p-value 0.68).

Hematocrit and hemoglobin levels at 3 months were significantly higher in group II (p-value 0.01 and 0.01 respectively)
Serum iron levels at 24 hours after birth and at 3 months were higher in group II (p-value 0.02 and <0.001 respectively). While serum ferritin levels at 24, 48 and at 3 months were higher in group II (p-value <0.001, <0.001 and <0.001 respectively).
Conclusion:
In full-term infants, DCC for at least 60 s improved hematocrit, hemoglobin, serum iron and serum ferritin levels after birth, without any harmful effects on infants and mothers. Thus, DCC could be considered the first step to reduce anemia in the first year of life, especially in settings with a high prevalence of iron deficiency anemia.

INTRODUCTION

The umbilical cord is the lifeline that connects the placenta to the fetus. It contains umbilical arteries that carry blood from the infant to the placenta and umbilical veins which carry blood from the placenta to the infant. Following birth, blood continues to flow through umbilical arteries (from the infant to the placenta) for approximately 20- 25 seconds and is negligible by 45 seconds. In the umbilical vein, however, blood continues to flow from the placenta to the infant for up to 3 minutes after delivery. This additional blood volume transferred from the placenta to the neonate at birth through the umbilical vein is defined as Placental transfusion. Placental transfusion is affected by three main factors namely uterine contractions following delivery, position of infant following delivery, and timing of umbilical cord clamping.[1,2]

Early cord clamping and cutting of the umbilical cord is widely practiced as part of the management of labor; it could deprive the neonate of about a quarter of its blood volume and iron.[3] A newborn who receives a placental perfusion at birth either from cord milking or delayed cord clamping, obtains about 30% more blood volume than the newborn whose cord is cut immediately.[4] Receiving an adequate blood volume from placental transfusion at birth may be protective for the distressed neonate.[5] The placenta contains approximately 100 ml of blood and the mean blood volume of a term infant is about 85 ml/kg. The interval between delivery and clamping of the umbilical cord can significantly affect a newborn's blood volume and total RBC mass. Early cord clamping reduces the placental transfusion and hence reduces mean blood volume by about 10%. World Health Organization recommends delaying cord clamping (defined variably as till pulsations cease or up to 120-180 sec) as the standard of care in the delivery room.[6]

Iron deficiency Anemia is a major worldwide public health problem in the children that affects the physical and mental health of the neonates. Early cord clamping (ECC) puts the newborn at increased risk of hypovolemic damage and iron loss, as well as of several blood disorders due to loss of hematopoietic stem cells.[7] On the other hand, the benefits of delayed cord clamping include improved iron status, hemoglobin, reduced need for blood transfusion, reduced risk of perinatal brain injury and improved hemodynamic stability after birth. However these potential benefits need to be balanced against possible harmful effects in infant (delayed resuscitation, hypothermia, polycythemia, hyperbilirubinemia and risk of intraventricular hemorrhage). A recent meta analysis by Mathew et al[6] reported that delayed cord clamping is beneficial in reducing anemia in term (15 RCTs) and preterm (14 RCTs) neonates. A local study by Saba et al[7] showed mean hematocrit level were significantly higher in the DCC group (58.3±.2% as compared to 61.3%±7.1 after 24 hours while 32.8±7.1% as compared to 61.3±7.1 after 48 hours). DCC resulted in a higher mean hematocrit (45.6 ± 5.6 versus 32.8 ± 7.1 at the end of three months) and hemoglobin concentration

(17.4 ± 2.2 g/dL vs 12.5 ± 4.1 g/dL at the end of 3 months). Nesheli et al[8] showed greater mean Hb, Hct , serum iron and transferrin saturation even at 6 months of age in the DCC group (95% CI; p<0.001, p<0.000, p<0.024 and p<0.009).

Very few local studies have evaluated whether the advantage in hematological parameters persist at 3 months of age. DCC is generally considered a new or unproven intervention. All mammals must transfer from placental to pulmonary respiration at birth. Ventilation of the lungs is followed by closure of the placental circulation. That is why obstetricians and midwives still rush to clamp the cord and avoid DCC. Yet, delayed clamping for half to three or more minutes allows continuing blood flow between the mother and her baby, and this may help the baby to adjust to breathing air. Squeezing blood along the umbilical cord towards the baby (milking the cord), can boost the baby's blood volume, and this may improve the baby's health.[9] Increasing the hemoglobin level and iron stores is attractive because anemia in early infancy is a frequent problem, especially in developing countries. Our study is aimed at comparing the effect of early cord clamping versus delayed cord clamping on hematological parameters at 24 hours, 48 hours and 3 months of age.

MATERIALS AND METHODS

The study was designed as a randomized controlled trial conducted at the Departments of Obstetrics and Neonatology, PAEC General Hospital, Islamabad, over a six-month period from September 18, 2020, to March 17, 2021. The sample size was calculated using the OpenEpi sample size calculator, based on an 80% study power, 5% absolute precision, and a 0.05 level of significance. Taking into account the mean hematocrit (Hct) at 24 hours—58.3 ± 2.2 in the early cord clamping (ECC) group versus 61.3 ± 7.1 in the delayed cord clamping (DCC) group—the required sample size was determined to be 49 neonates per group. A non-probability consecutive sampling technique was employed for participant selection.

Inclusion criteria consisted of full-term pregnancies with gestational age ranging from 37 to 41 weeks. Exclusion criteria included multiple gestations, Rh-negative mothers, babies limp at birth, major congenital malformations diagnosed antenatally, hydrops fetalis, placenta previa, placental abruption, maternal transfusions for anemia, and preterm deliveries.

Data collection began with obtaining informed written consent from pregnant women after explaining the study protocol. Ethical approval was obtained from the institutional ethics committee. Randomization was achieved using computer-generated numbers placed in serially numbered opaque envelopes. Eligible mothers were randomized just before delivery into Group 1 (ECC group) or Group 2 (DCC group), and neonatal hemoglobin levels were measured. Following delivery, neonates were positioned either between the mother's thighs in vaginal deliveries or on the mother's thigh in cesarean sections. The umbilical cord was clamped and cut 2–3 cm from the stump either within 30 seconds (ECC group) or at 3 minutes (DCC group). At 24 and 48 hours post-birth, 1 ml of venous blood was collected from each neonate for hemoglobin and hematocrit estimation using an automated hematology analyzer, and serum bilirubin was measured at 48 hours. Polycythemia was diagnosed when venous hematocrit reached 65%. Phototherapy was initiated when serum bilirubin levels fell within the treatment range according to the American Academy of Pediatrics (AAP) bilirubin nomogram. All neonates were clinically assessed daily for jaundice until discharge, and serum bilirubin was measured when jaundice appeared significant. Peak serum bilirubin levels were also recorded. Neonates were discharged based on hospital protocol and followed up at 3 months of age, when venous blood samples were again taken to measure hemoglobin, hematocrit, and serum ferritin. Serum ferritin was assessed using the turbidimetric method.

Data were analyzed using SPSS version 21.0. Mean and standard deviation were calculated for quantitative variables such as age, hemoglobin, hematocrit, and serum ferritin levels at 24 hours, 48 hours, and at 3 months. Frequencies and percentages were used for qualitative variables including gender, mode of delivery, and breastfeeding status. Independent t-tests were employed to compare means between groups. Potential effect modifiers like gender and gestational age were controlled through stratification and post-stratification analysis.

RESULTS:

Mean gestational age at the time of delivery was 39.47±1.42 weeks. Mean gestational age was 39.08±1.32 weeks in group I and 39.86±1.32 weeks in group II, p-value 0.006 (Table 3).

There were more number of male as compared female babies. There were 27 (55.10%) male babies in group I versus 29 (59.20%) male babies in group II, while there were 22 (44.90%) female babies in group I and 20 (40.80%) female babies in group II (p-value 0.683) [Table 4].

Mode of delivery was SVD in 56 (57.1%) patients and LSCS in 42 (42.9%) patients. There were 32 (65.30%) patients having SVD in group I and 24 (49.0%) in group II (p- value 0.102) [Table 10].

Mean birthweight of babies was 2924.59±516.44 grams. Mean birthweight in group I babies was 2860.81 grams in group I and 2988.37±562.3 grams in group II, p-value 0.223 (Table 5).

Mean HCT levels at 24 hours of birth in group I was 34.74±2.37 and 35.38±2.16 in group II (p-value 0.166). Mean HCT levels after 48 hours of birth were 34.14±2.30 in group I versus 34.34±2.44 in group II (p-value 0.67). Mean HCT levels after 3 months of birth were 34.15±2.32 in group I versus 35.33±2.18 in group II (p-value 0.011) [Table 6].

Mean HB levels after 24 hours of birth were 10.96± 0.71 mg/dL, at 48 hours of birth were 10.70±0.74 mg/dL and at 3 months of birth were 10.85±0.72 mg/dL. Mean HB at 24 hours of birth in group I was 10.86±0.74 mg/dL in group I versus 11.06±0.68 mg/dL in group II (p-value 0.16). Mean HB levels in after 48 hours of birth in group I was 10.67±0.72 mg/dL versus 10.73±0.76 mg/dL in group II (p-value 0.67). Mean HB levels after 3 months of birth in group I were 10.67±0.73 mg/dL versus 11.04±0.68 mg/dL in group II (p-value 0.011) [Table 7].

Mean serum iron levels at 24 hours of birth were 9.94±0.67 µmol/L, at 48 hours were 9.99±0.71 µmol/L and at 3 months were 10.45±0.93 µmol/L. Mean serum iron at 24 was 10.10±0.71 µmol/L in group I versus 9.79±0.60 µmol/L in group II (p-value 0.02). Mean serum iron at 48 hours of birth were 10.11±0.71 µmol/L in group I versus 9.88±0.71 µmol/L in group II (p-value 0.31). Mean serum iron at 3 months were 10.06±0.82 µmol/L in group I versus 10.84±0.88 µmol/L in group II (p-value <0.0001) [Table 8].

Mean serum ferritin levels at 24 hours of birth were 78.66±27.37 µg/L, at 48 hours of birth were 75.59±21.86 µg/L and after 48 hours of birth were 76.88±24.59 µg/L. On comparison of serum ferritin levels between the groups, mean serum ferritin levels were 55.91±9.3 µg/L in group I versus 101.41±19.26 µg/L in group II (p-value <0.001). Serum ferritin levels after 48 hours of birth were 61.12±9.54 µg/L in group I and 90.06±21.14 µg/L in group II (p-value <0.001). Mean serum ferritin levels at 3 months of birth were 60.31±10.29 µg/L in group I versus 93.45±23.57 µg/L in group II (p-value <0.001) [Table 9].

Stratification was performed on the basis of gestational age, gender of babies no significant effect of these effect modifiers was found with study outcomes between the groups [Table 10-19].

Table 3. Descriptive statistics of gestational age.

	Total Patients	Group I	Group II	P-value
Mean	39.47	39.08	39.86	0.006
S.D.	1.42	1.41	1.32	

Table 4. Frequency of gender of baby.

	Total Patients	Group I	Group II	P-value
Male	56 (57.1%)	27 (55.10%)	29 (59.20%)	0.683
Female	42 (42.9%)	22 (44.90%)	20 (40.80%)	

Table 5. Descriptive statistics of birth weight.

	Total Patients	Group I	Group II	P-value
Mean	2924.59	2860.81	2988.37	0.223
S.D.	516.44	463.45	562.03	

Table 6. Descriptive statistics and Comparison of HCT Levels Between the Groups.

HCT		Total Patients	Group I	Group II	P-value
At 24 Hours	Mean	35.06	34.74	35.38	0.166
	S.D.	2.28	2.37	2.16	
At 48 Hours	Mean	34.24	34.14	34.34	0.673
	S.D.	2.36	2.30	2.44	
At 03 Months	Mean	34.74	34.15	35.33	0.011
	S.D.	2.31	2.32	2.18	

Table 7. Descriptive statistics and comparison of mean HB levels between the groups.

HB		Total Patients	Group I	Group II	P-value
At 24 Hours	Mean	10.96	10.86	11.06	0.166
	S.D.	0.71	0.74	0.68	
At 48 Hours	Mean	10.70	10.67	10.73	0.673
	S.D.	0.74	0.72	0.76	
At 03 Months	Mean	10.85	10.67	11.04	0.011
	S.D.	0.72	0.73	0.68	

Table 8. Descriptive statistics and comparison of serum Iron levels between the groups.

Serum Iron		Total Patients	Group I	Group II	P-value
At 24 Hours	Mean	9.94	10.10	9.79	0.020
	S.D.	0.67	0.71	0.60	
At 48 Hours	Mean	9.99	10.11	9.88	0.131
	S.D.	0.71	0.71	0.71	
At 03 Months	Mean	10.45	10.06	10.84	<0.001
	S.D.	0.93	0.82	0.88	

Table 9. Descriptive statistics and comparison of serum ferritin levels between the groups.

Serum Ferritin		Total Patients	Group I	Group II	P-value
At 24 Hours	Mean	78.66	55.91	101.41	<0.001
	S.D.	27.37	9.30	19.26	
At 48 Hours	Mean	75.59	61.12	90.06	<0.001
	S.D.	21.86	d9.54	21.14	
At 03 Months	Mean	76.88	60.31	93.45	<0.001
	S.D.	24.59	10.29	23.57	

Table 10. Frequency of mode of delivery.

Mode of Delivery	Total Patients	Group I	Group II	P-value
SVD	56 (57.1%)	32 (65.30%)	24 (49.00%)	0.102
LSCS	42 (42.9%)	17 (34.70%)	25 (51.00%)	

Table 11. Stratification of gestational age to determine the association of age with HCT between the groups.
(Gestational Age Group = 37-39 Weeks)

HCT		Group L	Group N	P-value
At 24 Hours	Mean	34.77	35.05	0.691
	S.D.	2.28	2.28	
At 48 Hours	Mean	34.10	34.20	0.894
	S.D.	2.32	2.75	
At 03 Months	Mean	33.96	35.58	0.021
	S.D.	2.41	1.82	

(Gestational Age Group = 40-41 Weeks)

HCT		Group L	Group N	P-value
At 24 Hours	Mean	34.69	35.56	0.199
	S.D.	2.58	2.11	
At 48 Hours	Mean	34.21	34.42	0.751
	S.D.	2.31	2.30	
At 03 Months	Mean	34.46	35.20	0.274
	S.D.	2.21	2.37	

Table 12. Stratification of gestational age to determine the association of age with HB between the groups.
(Gestational Age Group = 37-39 Weeks)

HB		Group L	Group N	P-value
At 24	Mean	10.87	10.95	

Hours	S.D.	0.71	0.71	0.691
At 48 Hours	Mean	10.66	10.69	0.894
	S.D.	0.73	0.86	
At 03 Months	Mean	10.61	11.12	0.021
	S.D.	0.75	0.57	

(Gestational Age Group = 40-41 Weeks)

HB		Group L	Group N	P-value
At 24 Hours	Mean	10.84	11.11	0.199
	S.D.	0.81	0.66	
At 48 Hours	Mean	10.69	10.76	0.751
	S.D.	0.72	0.72	
At 03 Months	Mean	10.77	11.00	0.274
	S.D.	0.69	0.74	

Table 13. Stratification of gestational age to determine the association of age with serum iron between the groups.

(Gestational Age Group = 37-39 Weeks)

Serum Iron		Group L	Group N	P-value
At 24 Hours	Mean	10.04	9.92	0.577
	S.D.	0.69	0.76	
At 48 Hours	Mean	10.05	9.82	0.363
	S.D.	0.76	0.90	
At 03 Months	Mean	9.98	10.59	0.14
	S.D.	0.81	0.74	

(Gestational Age Group = 40-41 Weeks)

Serum Iron		Group L	Group N	P-value
At 24 Hours	Mean	10.19	9.72	0.008
	S.D.	0.74	0.49	
At 48 Hours	Mean	10.18	9.91	0.140
	S.D.	0.63	0.61	
At 03	Mean	10.18	10.97	

Months	S.D.	0.86	0.93	0.004

Table 14. Stratification of gestational age to determine the association of age with serum ferritin between the groups.

(Gestational Age Group = 37-39 Weeks)

Serum Ferritin		Group L	Group N	P-value
At 24 Hours	Mean	57.40	95.12	<0.001
	S.D.	9.23	18.11	
At 48 Hours	Mean	61.53	92.24	<0.001
	S.D.	10.00	23.13	
At 03 Months	Mean	59.10	92.56	<0.001
	S.D.	10.56	24.89	

(Gestational Age Group = 40-41 Weeks)

Serum Ferritin		Group L	Group N	P-value
At 24 Hours	Mean	53.58	104.75	<0.001
	S.D.	9.16	19.29	
At 48 Hours	Mean	60.47	88.91	<0.001
	S.D.	9.01	20.30	
At 03 Months	Mean	62.21	93.91	<0.001
	S.D.	9.84	23.24	

Table 15. Stratification of gender of baby to determine the association of gender with HCT between the groups.

(Gender = Male)

HCT		Group L	Group N	P-value
At 24 Hours	Mean	34.50	35.52	0.091
	S.D.	2.38	2.04	
At 48 Hours	Mean	34.05	33.96	0.879
	S.D.	2.04	2.16	
At 03 Months	Mean	34.13	35.63	0.017
	S.D.	2.24	2.30	

(Gender = Female)

HCT		Group L	Group N	P-value
At 24	Mean	35.04	35.18	0.845
	S.D.	2.37	2.37	

Hours				
At 48 Hours	Mean	34.25	34.90	0.445
	S.D.	2.62	2.76	
At 03 Months	Mean	34.18	34.90	
	S.D.	2.47	1.97	

Table 16. Stratification of gender of baby to determine the association of gender with HB between the groups.

(Gender = Male)

HB		Group L	Group N	P-value
At 24 Hours	Mean	10.78	11.10	0.091
	S.D.	0.74	0.64	
At 48 Hours	Mean	10.64	10.61	0.879
	S.D.	0.64	0.68	
At 03 Months	Mean	10.67	11.13	0.017
	S.D.	0.70	0.72	

(Gender = Female)

HB		Group L	Group N	P-value
At 24 Hours	Mean	10.95	10.99	0.845
	S.D.	0.74	0.74	
At 48 Hours	Mean	10.70	10.91	0.445
	S.D.	0.82	0.86	
At 03 Months	Mean	10.68	10.91	0.310
	S.D.	0.77	0.62	

Table 17. Stratification of gender of baby to determine the association of gender with serum iron between the groups.

(Gender = Male)

Serum Iron		Group L	Group N	P-value
At 24 Hours	Mean	9.92	9.84	0.613
	S.D.	0.66	0.58	
At 48 Hours	Mean	10.14	9.92	0.226
	S.D.	0.50	0.80	
At 03 Months	Mean	10.00	10.94	<0.001
	S.D.	0.75	0.98	

(Gender = Female)

Serum		Group L	Group N	P-value

Iron				
At 24 Hours	Mean	10.31	9.71	0.006
	S.D.	0.71	0.64	
At 48 Hours	Mean	10.04	9.82	0.348
	S.D.	0.91	0.58	
At 03 Months	Mean	10.12	10.68	0.034
	S.D.	0.92	0.82	

Table 18. Stratification of gender to determine the association of gender with serum ferritin between the groups.

(Gender = Male)

Serum Ferritin		Group L	Group N	P-value
At 24 Hours	Mean	55.48	99.83	<0.001
	S.D.	10.73	23.79	
At 48 Hours	Mean	60.11	96.14	<0.001
	S.D.	9.34	18.61	
At 03 Months	Mean	61.18	92.45	<0.001
	S.D.	10.19	23.86	

(Gender = Female)

Serum Ferritin		Group L	Group N	P-value
At 24 Hours	Mean	56.45	103.70	<0.001
	S.D.	7.39	9.71	
At 48 Hours	Mean	62.36	81.25	0.001
	S.D.	9.87	21.93	
At 03 Months	Mean	59.23	94.90	<0.001
	S.D.	10.56	23.87	

DISCUSSION:

The clamping of the umbilical cord in fundamental step during the third stage of labor. The discussion over the timing of clamping of the cord has been controversial. Initial attempts to quest for this are in the literature since start of the nineteenth century but insufficient results are available. The residual blood in the placenta is the focus in this issue. Long before around 2 decades back a study related to this topic was done and meta-analysis was done using its data with some other studies, it was concluded that after 40 seconds net-flow between placenta and infant reverses. And cord-clamping if delayed further 40 seconds can end up into a rise in the RPBV (residual placental blood volume) back to the level found when the cord was clamped before 20 seconds.[10]

Later on when the timing of cold clamping was studied on larger scale with more variables in focus then it came to recognition that cord clamping timing in normal deliveries may have no significant effect but late clamping in premature neonates is beneficial because it reduces the incidence of respiratory distress syndrome. In 2005 a literature review showed almost similar observations i.e. latecord clamping for full term neonates has no extra advantage. The late cord clamping increases the blood viscosity by 40% initially which may revert to near normal after 24 hours.[11-12]

Van Rheenen P and Brabin BJ, et al concluded that delayed cord-clamping in infants, with anemic mothers can decrease the risk of anemia in infants till 2-3 months age, without an associated rise in the chances of perinatal complications. This step just after the birth of a neonate in countries where fetal anemia is a common condition can improve the morbidity and mortality of neonates and infants.[13]

Several well designed randomized controlled trials in term infants on DCC have shown benefits of higher hemoglobin levels, lesser anemia and better iron stores in the early neonatal period and extending to early infancy. Potential disadvantages of delayed cord clamping in term babies are polycythemia, jaundice and increased requirement of phototherapy. Two major metaanalysis had concluded that DCC in term infants improves the hematological status of the babies in early infancy with a minor risk of polycythemia and jaundice requiring phototherapy.[14-15]

Although several studies on DCC have been conducted in preterm neonates, their results have been inconsistent. Immediate cord clamping is still the standard practice in preterm infants. Preterm babies, when clamped late, have been shown to have higher hemoglobin, better iron stores, lesser transfusion requirement, higher blood pressure, better cerebral oxygenation, lower rates of IVH, lesser ventilation and surfactant requirement, lower rates of late onset sepsis and lesser motor disability.[16-17] Studies have failed to demonstrate the effects of timing of cord clamping on development of PDA, NEC, bronchopulmonary dysplasia or retinopathy of prematurity.[18] Recent systematic review and a metaanalysis of 15 studies including 738 preterm infants determined that DCC was associated with fewer infants requiring transfusions for anemia, lower IVH and NEC. However the peak bilirubin concentration was higher. Yet, results have been inconsistent with regard to duration of the hematological benefits.[17-18]

A recent study found that, milking the cord 4 times has the same beneficial effect in preterm infants as delayed cord clamping.[19] Though a fair number of trials have shown similar results in term infants, only a few studies in preterm infants have evaluated the extended benefit

CONCLUSION:

In full-term infants, DCC for at least 60 s improved hematocrit, hemoglobin, serum iron and serum ferritin levels after birth, without any harmful effects on infants and mothers. Thus, DCC could be considered the first step to reduce anemia in the first year of life, especially in settings with a high prevalence of iron deficiency anemia.

REFERENCES:

1. Bhatt S, Polglase GR, Wallace EM, Te Pas AB, Hooper SB. Ventilation before umbilical cord clamping improves the physiological transition at birth. Frontiers in pediatrics. 2014 Oct 20;2:113.

2. Kc A, Singhal N, Gautam J, Rana N, Andersson O. Effect of early versus delayed cord clamping in neonate on heart rate, breathing and oxygen saturation during first 10 minutes of birth-randomized clinical trial. Maternal health, neonatology and perinatology. 2019 Dec;5:1-7.

3. Jain MK, Bhedru N, Jain A. Assessment of effectiveness of delayed cord clamping and umbilical cord milking in early term and preterm infants. Int J Contemp Pediatr. 2018 Nov;5(6):2071.

4. Andersson O, Hellström-Westas L, Andersson D, Domellöf M. Effect of delayed versus early umbilical cord clamping on neonatal outcomes and iron status at 4 months: a randomised controlled trial. Bmj. 2011 Nov 15;343..

5. Katheria A, Blank D, Rich W, Finer N. Umbilical cord milking improves transition in premature infants at birth. PloS one. 2014 Apr 7;9(4):e94085.

6. Mathew JL. Timing of umbilical cord clamping in term and preterm deliveries and infant and maternal outcomes: a systematic review of randomized controlled trials. Database of Abstracts of Reviews of Effects (DARE): Quality-assessed Reviews [Internet]. 2011.

7. Saba K, Majeed T, Bukhari MH. Early versus delayed umbilical cord clamping leads to neonatal anemia. Annals of King Edward Medical University. 2012;18(3):309-.

8. Nesheli HM, Esmailzadeh S, Haghshenas M, Bijani A, Moghaddams TG. Effect of late vs early clamping of the umbilical cord (on haemoglobin level) in full-term neonates. J Pak Med Assoc. 2014 Nov 1;64(11):1303-5.

9. Rabe H, Gyte GM, Díaz-Rossello JL, Duley L. Effect of timing of umbilical cord clamping and other strategies to influence placental transfusion at preterm birth on maternal and infant outcomes. Cochrane Database of Systematic Reviews. 2019(9).

10. Ogata ES, Kitterman JA, Kleinberg F, Dong L, Willis M, Mates J, Phibbs RH. The effect of time of cord clamping and maternal blood pressure on placental transfusion with cesarean section. American Journal of Obstetrics and Gynecology. 1977 May 15;128(2):197-200..

11. Ranjit T, Nesargi S, Rao PS, Sahoo JP, Ashok C, Chandrakala BS, Bhat S. Effect of early versus delayed cord clamping on hematological status of preterm infants at 6 wk of age. The Indian Journal of Pediatrics. 2015 Jan;82:29-34..

12. ML CT, JM BC. Early or late umbilical cord clamping? A systematic review of the literature. InAnales de Pediatria (Barcelona, Spain: 2003) 2005 Jul 1 (Vol. 63, No. 1, pp. 14-21).

13. Van Rheenen P, Brabin BJ. Late umbilical cord-clamping as an intervention for reducing iron deficiency anaemia in term infants in developing and industrialised countries: a systematic review. Annals of tropical paediatrics. 2004 Mar 1;24(1):3-16.

14. Chaparro CM, Neufeld LM, Alavez GT, Cedillo RE, Dewey KG. Effect of timing of umbilical cord clamping on iron status in Mexican infants: a randomised controlled trial. The Lancet. 2006 Jun 17;367(9527):1997-2004.

15 Emhamed MO, van Rheenen P, Brabin BJ. The Early Effects of Delayed Cordc Clamping in Term Infants Born to Libyan Mothers. Tropical doctor. 2004 Oct;34(4):218-22.

16. Kugelman A, Borenstein-Levin L, Riskin A, Chistyakov I, Ohel G, Gonen R, Bader D. Immediate versus delayed umbilical cord clamping in premature neonates born< 35 weeks: a prospective, randomized, controlled study. American journal of perinatology. 2007 May;24(05):307-15.

17. Mercer JS, McGrath MM, Hensman A, Silver H, Oh W. Immediate and delayed cord clamping in infants born between 24 and 32 weeks: a pilot randomized controlled trial. Journal of perinatology. 2003 Sep;23(6):466-72.

18 Oh W, Fanaroff AA, Carlo WA, Donovan EF, McDonald SA, Poole WK. Effects of delayed cord clamping in very-low-birth-weight infants. Journal of Perinatology. 2011 Apr;31(1):S68-71.

19 Sommers R, Stonestreet BS, Oh W, Laptook A, Yanowitz TD, Raker C, Mercer J. Hemodynamic effects of delayed cord clamping in premature infants. Pediatrics. 2012 Mar 1;129(3):e667-72