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"COMPARISON OF EARLY VS. DELAYED CORD CLAMPING ON NEONATAL OUTCOMES IN A KARACHI TERTIARY CARE HOSPITAL

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Abstract
Physiological studies have shown that delayed umbilical cord clamping (DCC) results in an increase of 20–40 ml of blood per kilogram of body weight for the neonate, which leads to higher hematocrits, a reduced need for red blood cell (RBC) transfusions, and a decreased frequency of iron-deficiency anemia compared to early cord clamping (ECC). However, DCC has also been associated with an increased risk of neonatal jaundice, polycythemia, and blood viscosity compared to ECC. Given these mixed outcomes, the ideal timing for umbilical cord clamping remains undetermined. This study aimed to compare the efficacy of early versus delayed cord clamping in preventing adverse neonatal outcomes at Tertiary Care Hospital, Karachi. Conducted as a randomized control trial at the Department of Obstetrics & Gynaecology Unit-2, Civil Hospital, Karachi, the study spanned six months from September 3, 2018, to March 3, 2019. Data were prospectively collected from 420 patients after obtaining consent. Demographic data were presented using simple descriptive statistics, while qualitative variables were presented as frequencies and percentages. A post-stratification chi-square test was applied, with a p-value of ≤ 0.05 considered significant. The study included 420 patients, evenly divided between the early and delayed cord clamping groups. The mean age in the groups was 31.56±3.91 and 32.71±4.01, respectively. Efficacy rates were 52.4% in the early cord clamping group and 75.2% in the delayed cord clamping group. The study concluded that delayed cord clamping is both safe and feasible, with fewer infants requiring red blood cell transfusions than those with early cord clamping. It also improves several important hematological parameters for newborns, particularly in countries with a high incidence of anemia in newborns and children.

KEY WORDS: Vaginal delivery, cesarean section, early cord clamping, delayed cord clamping, hemoglobin and bilirubin level.

INTRODUCTION

Umbilical cord is a conduit between the developing embryo or fetus and the placenta. During prenatal development, the umbilical cord is physiologically and genetically part of the fetus and (in humans) normally contains two arteries (the umbilical arteries) and one vein (the umbilical vein), buried within Wharton's jelly. The umbilical vein supplies the fetus with oxygenated, nutrient-rich blood from the placenta. Conversely, the fetal heart pumps low oxygen containing blood, nutrient depleted blood through the umbilical arteries back to the placenta [1, 2].

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The umbilical cord is the essential life-keeping connection between fetus and placenta. It represents a strong connection to the fetomaternal interface while permitting fetal mobility that is essential for general fetal development and neuro-motor development in particular. When a baby is born, the umbilical cord is cut, and there is a stump left which should dry and fall off by the time of 5 to 15 days after birth. Delayed cord clamping, which was adopted by American Academy of Pediatrics in all deliveries, is defined as ligation of the umbilical cord 2-3 minutes after birth or on stoppage of cord pulsations, will lead to a huge amount of blood transfused from the placenta than cord clamping done promptly after delivery [5,6].

However, delayed cord clamping may not be possible, as it could be forgotten by obstetrician or cord may have to be clamped promptly in case of fetal distress or complications at birth. In such cases, we perform umbilical cord milking to transfer the extra blood to decrease blood transfusions and augment haemoglobin in both preterm and term infants. Both 22 umbilical cord milking and delayed cord clamping have been related to high iron stores in neonates, but it may strongly affect the cerebral blood flow dynamics [7,8,9].

Delayed cord clamping, in which we clamp the cord after 30 to 180 seconds of birth, permits the transfer of blood from placenta to the newborn, makes the hematological values and iron stores in both preterm and term infants better, decreases anemia, decreases the need for blood transfusion, improves cerebral oxygenation in earlier born babies and provides considerable amount of placental stem cells to the baby without causing any adverse effects to the mother [10,11]. Active management of the third stage of labor comprising administration of a uterotonic agent, cord clamping and cutting, and controlled cord traction has supplanted the 'physiological' (noninterventionist) approach; as a consequence, the umbilical cord is usually clamped soon after delivery of the baby [12].

The observation that the cord can contain up to 20 mL of blood raised the possibility of delaying clamping to allow placental transfusion to the baby [13]. Perinatal iron deficiency anemia is a major public health problem in young children worldwide and is associated with poor neurodevelopment [14]. Delayed umbilical cord clamping has been suggested as a measure to prevent infant iron deficiency. Studies have found that up to 50% infants in developing countries become anemic by 12 months of age [15]. In a survey in India, 70% of infants between 6 and 11 months of age were found to be anemic[16]. Timing of umbilical cord clamping has been and still is a highly controversial issue. One of the major advantages could be to increase the circulating volume and hemoglobin level [17]. The benefits of the former include less respiratory distress and reduced need for later transfusions. Increasing the hemoglobin level and iron stores is attractive because anemia in early infancy is a frequent problem, especially in developing countries [18].

The current obstetric approach in western medicine is to clamp the cord within the first 10 to 15 seconds after birth [19]. However, there has been no sound evidence in favor of this approach in comparison to the millennial practice of clamping the cord between 1 and 3 minutes after birth. Deferral of cord clamping provides about 80 ml of blood after 1 min and 100 ml after 3 min of birth [20]. This contributes 40-50 mg/kg of extra iron to the neonate, which might prevent iron deficiency in the first year of life [21]. Another potential benefit of delayed cord clamping is increase in haemopoietic stem cells transferred to the newborn which might play role in different blood disorders and immune conditions [22]. Observational study suggests that 6 delayed umbilical cord clamping puts newborns at higher risk of suffering from polycythemia, respiratory symptoms, hyperbilirubinemia, and other neonatal disorders [23]. Deeba et al study included two hundred women, 100 in each of the 2 groups. Neonates had hemoglobin level > 14 gm/dl, 51% in early clamping group and 63% in delayed clamping group [24]. Another study showed that serum total bilirubin level was < 16 mg/dl in 98% in early clamping group and 97.9% in delayed clamping group [25]. However, several studies show variable efficacies.

The rationale of the study is to determine efficacy of early versus delayed cord clamping in preventing adverse neonatal outcome of anemia and hyperbilirubinemia. The main objective of this study is to compare the efficacy of early versus delayed cord clamping in preventing neonatal outcome in patients presenting at Tertiary Care Hospital, Karachi.

METHODS AND MATERIALS

This randomized control trial was conducted at the Department of Obstetrics & Gynaecology Unit-2, Civil Hospital, Karachi, over a six-month period from September 3, 2018, to March 3, 2019, following the approval of the study synopsis. The sample size of 420 was determined using WHO software, with parameters including an alpha of 5%, a test power of 80%, and reference to a previous study by Deeba et al., which included 200 women, with 100 in each group. Hemoglobin levels greater than 14 g/dL were found in 51% of the early clamping group and 63% of the delayed clamping group, leading to a calculated sample size of 210 in each group. The sampling technique employed was non-probability consecutive sampling.

Inclusion criteria for the study were gestational age over 36 weeks, as assessed by last menstrual period (LMP) and dating scan, women with singleton pregnancies, parity greater than 1, and an age range of 20-40 years. Exclusion criteria included non-consenting patients, those with a history of type 2 diabetes mellitus, pre-eclampsia (defined as blood pressure above 140/90 mmHg and proteinuria over 0.3 g per day after 20 weeks of gestation), anemia requiring blood transfusion, thromboembolic disorders, abnormal placenta as proven by ultrasound scan, stroke, renal impairment, chronic obstructive pulmonary disease, asthma, chronic liver disease, hypothyroidism, and congestive cardiac failure.

This study was conducted following approval from the College of Physicians and Surgeons Pakistan. Consenting cases, as defined in the operational definition and meeting the inclusion criteria, were enrolled from the Department of Obstetrics & Gynaecology Unit-2, Civil Hospital. Informed consent was obtained from each patient. Pregnant women undergoing delivery were randomly assigned to either the early cord clamping group (Group A) or the delayed cord clamping group (Group B) by selecting opaque paper bags. For Group A, the cord was clamped within 10 seconds after delivery, while for Group B, the cord was clamped within 180 seconds. The time from the complete delivery of the baby to the first clamp on the umbilical cord was measured with a stopwatch by the research assistant.

After delivery, the baby was kept between the mother's legs at approximately the same level as the placenta. Following the cutting of the cord, a blood sample was collected from the cut end of the umbilical cord of the neonate for hemoglobin and total bilirubin levels by the researcher under the supervisor's guidance. Efficacy was considered positive if the neonatal hemoglobin level was greater than 14 g/dL and total bilirubin was less than 16 mg/dL. Quantitative variables, such as maternal age, APGAR score, BMI, parity, gravida, and serum total bilirubin and hemoglobin levels in both groups, were recorded. Qualitative variables, including gestational age, socioeconomic status, educational status, and mode of delivery, were also documented in a proforma.

Data was entered and analyzed using SPSS version 16. Mean and standard deviation were calculated for continuous variables such as maternal age, APGAR score, BMI, parity, gravida, and serum total bilirubin and hemoglobin levels in both groups. Frequencies and percentages were calculated for categorical variables such as gestational age, socioeconomic status, educational status, mode of delivery, and efficacy (Yes/No). Chi-square tests were used to compare the efficacy between the two groups. Effect modifiers were controlled through stratification of maternal age, gestational age, BMI, parity, gravida, socioeconomic status, educational status, and mode of delivery to evaluate their impact on the outcome variable, i.e., efficacy. Post-stratification chi-square tests were applied, and a p-value of ≤ 0.05 was considered significant.

Results

A total of 420 women visiting at Department of Obstetrics & Gynaecology Unit-2, Civil Hospital, Karachi who met the inclusion and exclusion criteria were included in this study.

Descriptive Statistics of Groups A and B

The descriptive statistics for maternal age, BMI, height, and weight for both groups are summarized in Table 1. The mean maternal age was 28.56±3.91 years for Group A and 27.71±4.01 years for Group B, with ages ranging from 24 to 38 years in both groups. The BMI averaged 31.28±2.56 kg/m² in Group A and 32.72±2.31 kg/m² in Group B, with a range of 27-34 kg/m². The mean height was 145.41±11.47 cm for Group A and 138.04±14.51 cm for Group B, ranging from 120 to 180 cm. The average weight was 121.84±23.02 kg in Group A and 110.84±28.57 kg in Group B, with a range of 52-154 kg.

Table 1: Descriptive Statistics for Groups A and B

Variable	Group A (Mean ± SD)	Min-Max	Group B (Mean ± SD)	Min-Max
Maternal Age (years)	28.56 ± 3.91	24-38	27.71 ± 4.01	24-38
BMI (kg/m²)	31.28 ± 2.56	27-34	32.72 ± 2.31	27-34
Height (cm)	145.41 ± 11.47	120-180	138.04 ± 14.51	120-180
Weight (kg)	121.84 ± 23.02	52-154	110.84 ± 28.57	52-154

Maternal Age Distribution (Table 2)

Maternal age distribution revealed that 45.2% of mothers in Group A and 43.8% in Group B were aged 20-30 years, while 54.8% in Group A and 56.2% in Group B were aged 31-40 years.

Table 2: Maternal Age Distribution in Groups A and B

Maternal Age (years)	Group A (n=210)	Group B (n=210)
20-30	95 (45.2%)	92 (43.8%)
31-40	115 (54.8%)	118 (56.2%)

Gestational Age Distribution (Table 3)

Gestational age distribution showed that 69.5% of pregnancies in Group A and 60% in Group B were less than 40 weeks. Conversely, 30.5% in Group A and 40% in Group B were 40 weeks or more.

Table 3: Gestational Age Distribution in Groups A and B

Gestational Age (weeks)	Group A (n=210)	Group B (n=210)
< 40	146 (69.5%)	126 (60%)
≥ 40	64 (30.5%)	84 (40%)

BMI Distribution (Table 4)

The BMI distribution indicated that 45.7% of mothers in Group A and 78.6% in Group B had a BMI less than 30 kg/m², while 54.3% in Group A and 21.4% in Group B had a BMI of 30 kg/m² or more.

Table 4: BMI Distribution in Groups A and B

BMI (kg/m²)	Group A (n=210)	Group B (n=210)
< 30	96 (45.7%)	165 (78.6%)
≥ 30	114 (54.3%)	45 (21.4%)

Parity Distribution (Table 5)

Parity distribution showed that 41% of mothers in Group A and 71% in Group B had fewer than four previous pregnancies. In contrast, 59% in Group A and 29% in Group B had four or more previous pregnancies.

Table 5: Parity Distribution in Groups A and B

Parity	Group A (n=210)	Group B (n=210)
< 4	86 (41%)	149 (71%)
≥ 4	124 (59%)	61 (29%)

Gravida Distribution (Table 6)

Gravida distribution demonstrated that 16.7% of mothers in Group A and 12.4% in Group B had fewer than three pregnancies, while 83.3% in Group A and 87.6% in Group B had three or more pregnancies.

Table 6: Gravida Distribution in Groups A and B

Gravida	Group A (n=210)	Group B (n=210)
< 3	35 (16.7%)	26 (12.4%)
≥ 3	175 (83.3%)	184 (87.6%)

Socioeconomic Status Distribution (Table 7)

The socioeconomic status distribution revealed that 11% of mothers in Group A and 4.8% in Group B were in the lower socioeconomic status category. In the lower middle category, 21.4% in Group A and 22.9% in Group B were represented. For the middle category, 21.9% in Group A and 21.4% in Group B were represented. In the upper middle category, 30% in Group A and 35.7% in Group B were included. Lastly, 15.7% in Group A and 15.2% in Group B were in the upper socioeconomic status category.

Table 7: Socioeconomic Status Distribution in Groups A and B

Socioeconomic Status	Group A (n=210)	Group B (n=210)
Lower	23 (11%)	10 (4.8%)
Lower Middle	45 (21.4%)	48 (22.9%)
Middle	46 (21.9%)	45 (21.4%)
Upper Middle	63 (30%)	75 (35.7%)
Upper	33 (15.7%)	32 (15.2%)

Educational Status Distribution (Table 8)

Educational status distribution showed that 3.3% of mothers in Group A and 11.9% in Group B were illiterate. For primary education, 7.6% in Group A and 17.1% in Group B were represented. In the secondary education category, 20.5% in Group A and 29.5% in Group B were included. For higher education, 20.5% in Group A and 41.4% in Group B were represented.

Table 8: Educational Status Distribution in Groups A and B

Educational Status	Group A (n=210)	Group B (n=210)
Illiterate	7 (3.3%)	25 (11.9%)
Primary	16 (7.6%)	36 (17.1%)
Secondary	43 (20.5%)	62 (29.5%)
Higher	43 (20.5%)	87 (41.4%)

Mode of Delivery Distribution (Table 9)

Mode of delivery distribution revealed that 20.5% of mothers in Group A and 12.4% in Group B had vaginal deliveries. Cesarean deliveries were 79.5% in Group A and 87.6% in Group B.

Table 9: Mode of Delivery Distribution in Groups A and B

Mode of Delivery	Group A (n=210)	Group B (n=210)
Vaginal	43 (20.5%)	26 (12.4%)
Cesarean	167 (79.5%)	184 (87.6%)

Efficacy in Preventing Neonatal Outcomes (Table 10)

Efficacy of early versus delayed cord clamping in preventing adverse neonatal outcomes was significantly higher in Group B (75.2%) compared to Group A (52.4%), with a p-value of 0.00.

Table 10: Efficacy of Early Cord Clamping in Preventing Neonatal Outcomes

Efficacy	Group A (n=210)	Group B (n=210)	P Value
Yes	110 (52.4%)	158 (75.2%)	0.00
No	100 (47.6%)	52 (24.8%)	

Efficacy According to Maternal Age (Table 11)

For mothers aged 20-30 years, efficacy was 57.9% in Group A and 77.2% in Group B (p = 0.01). For those aged 31-40 years, efficacy was 47.8% in Group A and 73.7% in Group B (p = 0.01).

Table 11: Efficacy of Early Cord Clamping by Maternal Age

Age (years)	Efficacy Group A	Efficacy Group B	P Value
20-30	Yes: 55 (57.9%)	Yes: 71 (77.2%)	0.01
	No: 40 (42.1%)	No: 21 (22.8%)	
31-40	Yes: 55 (47.8%)	Yes: 87 (73.7%)	0.01
	No: 60 (52.2%)	No: 31 (26.3%)	

Efficacy According to Gestational Age (Table 12)

For pregnancies less than 40 weeks, efficacy was 58.9% in Group A and 75.4% in Group B (p = 0.01). For pregnancies 40 weeks or more, efficacy was 37.5% in Group A and 75% in Group B (p = 0.01).

Table 12: Efficacy of Early Cord Clamping by Gestational Age

Gestational Age (weeks)	Efficacy Group A	Efficacy Group B	P Value
< 40	Yes: 86 (58.9%)	Yes: 95 (75.4%)	0.01
	No: 60 (41.1%)	No: 31 (24.6%)	
≥ 40	Yes: 24 (37.5%)	Yes: 63 (75%)	0.01
	No: 40 (62.5%)	No: 21 (25%)	

Efficacy According to BMI Status (Table 13)
In mothers with a BMI less than 30 kg/m², efficacy was 49% in Group A and 75.8% in Group B (p = 0.01). For those with a BMI of 30 kg/m² or more, efficacy was 55.3% in Group A and 73.3% in Group B (p = 0.03).

Table 13: Efficacy of Early Cord Clamping by BMI Status

BMI Status (kg/m²)	Efficacy Group A	Efficacy Group B	P Value
< 30	Yes: 47 (49%)	Yes: 125 (75.8%)	0.01
	No: 49 (51%)	No: 40 (24.2%)	
≥ 30	Yes: 63 (55.3%)	Yes: 33 (73.3%)	0.03
	No: 51 (44.7%)	No: 12 (26.7%)	

Efficacy According to Parity (Table 14)
For mothers with fewer than four previous pregnancies, efficacy was 51.2% in Group A and 75.2% in Group B (p = 0.01). For those with four or more previous pregnancies, efficacy was 53.2% in Group A and 75.4% in Group B (p = 0.01).

Table 14: Efficacy of Early Cord Clamping by Parity

Parity	Efficacy Group A	Efficacy Group B	P Value
< 4	Yes: 44 (51.2%)	Yes: 112 (75.2%)	0.01
	No: 42 (48.8%)	No: 37 (24.8%)	
≥ 4	Yes: 66 (53.2%)	Yes: 46 (75.4%)	0.01
	No: 58 (46.8%)	No: 15 (24.6%)	

Efficacy According to Gravida (Table 15)
For mothers with fewer than three pregnancies, efficacy was 54.3% in Group A and 96.2% in Group B (p = 0.01). For those with three or more pregnancies, efficacy was 52% in Group A and 72.3% in Group B (p = 0.01).

Table 15: Efficacy of Early Cord Clamping by Gravida

Gravida	Efficacy Group A	Efficacy Group B	P Value
< 3	Yes: 19 (54.3%)	Yes: 25 (96.2%)	0.01
	No: 16 (45.7%)	No: 1 (3.8%)	
≥ 3	Yes: 91 (52%)	Yes: 133 (72.3%)	0.01
	No: 84 (48%)	No: 51 (27.7%)	

Efficacy According to Socioeconomic Status (Table 16)
In the lower socioeconomic status category, efficacy was 65.2% in Group A and 100% in Group B (p = 0.01). In the lower middle category, efficacy was 44.4% in Group A and 75% in Group B (p = 0.01). In the middle category, efficacy was 50% in Group A and 75.6% in Group B (p = 0.01). In the upper middle category, efficacy was 52.4% in Group A and 76% in Group B (p = 0.01). In the upper category, efficacy was 57.6% in Group A and 65.6% in Group B (p = 0.50).

Table 16: Efficacy of Early Cord Clamping by Socioeconomic Status

Socioeconomic Status	Efficacy Group A	Efficacy Group B	P Value
Lower	Yes: 15 (65.2%)	Yes: 10 (100%)	0.01
	No: 8 (34.8%)	No: 0 (0%)	
Lower Middle	Yes: 20 (44.4%)	Yes: 36 (75%)	0.01
	No: 25 (55.6%)	No: 12 (25%)	

Middle	Yes: 23 (50%)	Yes: 34 (75.6%)	0.01
	No: 23 (50%)	No: 11 (24.4%)	
Upper Middle	Yes: 36 (52.4%)	Yes: 57 (76%)	0.01
	No: 30 (47.6%)	No: 18 (24%)	
Upper	Yes: 19 (57.6%)	Yes: 21 (65.6%)	0.50
	No: 14 (42.4%)	No: 11 (34.4%)	

Efficacy According to Educational Status (Table 17)
For illiterate mothers, efficacy was 42.9% in Group A and 68% in Group B (p = 0.22). For primary education, efficacy was 68.8% in Group A and 75% in Group B (p = 0.63). For secondary education, efficacy was 46.5% in Group A and 79% in Group B (p = 0.01). For higher education, efficacy was 52.8% in Group A and 74.7% in Group B (p = 0.01).

Table 17: Efficacy of Early Cord Clamping by Educational Status

Educational Status	Efficacy Group A	Efficacy Group B	P Value
Illiterate	Yes: 3 (42.9%)	Yes: 17 (68%)	0.22
	No: 4 (57.1%)	No: 8 (32%)	
Primary	Yes: 11 (68.8%)	Yes: 27 (75%)	0.63
	No: 5 (31.2%)	No: 9 (25%)	
Secondary	Yes: 20 (46.5%)	Yes: 49 (79%)	0.01
	No: 23 (53.5%)	No: 13 (21%)	
Higher	Yes: 76 (52.8%)	Yes: 65 (74.7%)	0.01
	No: 68 (47.2%)	No: 22 (25.3%)	

Efficacy According to Mode of Delivery (Table 18)
For vaginal deliveries, efficacy was 37.2% in Group A and 96.2% in Group B (p = 0.01). For cesarean deliveries, efficacy was 56.3% in Group A and 72.3% in Group B (p = 0.01).

Table 18: Efficacy of Early Cord Clamping by Mode of Delivery

Mode of Delivery	Efficacy Group A	Efficacy Group B	P Value
Vaginal	Yes: 16 (37.2%)	Yes: 25 (96.2%)	0.01
	No: 27 (62.8%)	No: 1 (3.8%)	
Cesarean	Yes: 94 (56.3%)	Yes: 133 (72.3%)	0.01
	No: 73 (43.7%)	No: 51 (27.7%)	

Discussion
Perinatal iron deficiency has received little attention in the past, due to the belief that infants are protected from iron deficiency unless the mother is markedly anemic. Therefore, it is important to develop cost-effective interventions to improve the hematologic status of millions of children affected by this condition worldwide. Iron stores at birth are correlated with and determined by the transplacental iron transferred to the fetus and the blood transferred from the placenta at the time of delivery, which in turn is influenced by the timing of umbilical cord clamping. One potential benefit of delayed cord clamping is the increase in hematopoietic stem cells transferred to the newborn, which might play a role in various blood disorders and immune conditions. Delayed cord clamping until pulsations cease is the physiological way of treating the cord and is not associated with adverse effects in normal deliveries.

A study involving a total of 420 patients (210 in each of the early versus delayed cord clamping groups) found the efficacy rates to be 52.4% for the early clamping group and 75.2% for the delayed clamping group. A randomized controlled trial conducted locally with 200 women (100 in each group) reported mean maternal hemoglobin (Hb) levels of 9.75 g/dL in Group A and 9.95 g/dL in Group B. The average neonatal Hb was 14.1 g/dL in Group A and 15.2 g/dL in Group B ($p = 0.008$). Additionally, 49% of neonates in Group A and 37% in Group B had Hb < 14 g/dL. Serum bilirubin values at birth and 6 hours after birth were 1.8 mg/dL and 2.5 mg/dL for Group A and 1.9 mg/dL and 2.7 mg/dL for Group B, respectively, with an insignificant difference in bilirubin levels after 6 hours ($p = 0.186$) [26].

Another Bangladeshi study included 130 mothers, with 98 analyzed (50 in the early cord clamping group and 48 in the late cord clamping group). Mean venous hemoglobin and hematocrit values measured at around 6 and 24 to 48 hours of life were within physiological limits but showed significant differences between the two groups. The prevalence of anemia (Hb < 14 g%) was not significantly higher in group-I than in group-II, but relatively more newborns were anemic in group-I[27].

A study that analyzed pre-term and early-term infants who underwent delayed cord clamping (DCC) and umbilical cord milking (UCM) found no significant difference in hemoglobin (Hb), hematocrit (HCT), blood sugar, bilirubin level (TSB), or body temperature between the groups. However, significant differences were observed in the weight and cord pH of neonates. There were also no significant differences in NICU admission rates for respiratory distress syndrome (RDS), sepsis, phototherapy, need for oxygen, saline boluses, PRBC transfusion, or polycythemia between the groups, indicating that both DCC and UCM are equally effective in improving hematologic parameters[28].

Another study conducted in Argentina with 276 newborns reported mean venous hematocrit values at 6 hours of life to be 53.5% (group 1), 57.0% (group 2), and 59.4% (group 3). The prevalence of hematocrit < 45% (anemia) was significantly lower in groups 2 and 3 than in group 1. The prevalence of hematocrit > 65% was similar in groups 1 and 2 (4.4% and 5.9%, respectively) but significantly higher in group 3 (14.1%) versus group 1 (4.4%). There were no significant differences in other neonatal outcomes or maternal postpartum hemorrhage[29].

Delayed cord clamping at birth increases neonatal mean venous hematocrit within a physiological range, with neither significant differences nor harmful effects observed among the groups.

Conclusion

Delayed cord clamping at birth is found to be effective in improving hematologic parameters without affecting the cerebral blood flow indices or producing any noteworthy significant adverse neonatal outcome in initial 48 hrs of life. Furthermore, this intervention seems to reduce the incidence of neonatal anemia. This practice has been shown to be safe and should be practiced to increase neonatal haemoglobin and haematocrit values at birth. Thus, overall, from the observations of this study, we can say that there is significant difference in delayed cord clamping versus early cord clamping. Early cord clamping could deprive the neonate of about a quarter of its blood volume and iron. This evidence would also enable us in setting standards and clinical guidelines in order to provide good care to our patients. This study can serve as preliminary study to be followed by other large-scale studies which can provide the required data to health care authorities for planning appropriate strategies

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