



EFFECT OF DELAYED VERSUS EARLY CORD CLAMPING ON HAEMATOCRIT & SERUM BILIRUBIN IN TERM LOW BIRTH WEIGHT NEONATES.

Dr.U.Ramanjaneyulu	Assistant professor, Department of Paediatrics, Siddhartha medical college, Vijayawada, N.T.R district, Andhra Pradesh.
Dr.G.Deepthi*	Assistant professor, Department of Paediatrics, Siddhartha medical college, Vijayawada, N.T.R district, Andhra Pradesh.*Corresponding Author
Dr.M.Praneeth	3 rd year post graduate, Department of Paediatrics, Siddhartha medical college, Vijayawada, N.T.R district, Andhra Pradesh.
Dr.V.Namratha	3 rd year post graduate, Department of Paediatrics, Siddhartha medical college, Vijayawada, N.T.R district, Andhra Pradesh.
Dr.P.Siva kumar	3 rd year post graduate, Department of Paediatrics, Siddhartha medical college, Vijayawada, N.T.R district, Andhra Pradesh.
Dr.G.Mounika	Senior resident, Department of Paediatrics, Siddhartha medical college, Vijayawada, N.T.R district, Andhra Pradesh.

ABSTRACT

AIM-

- To study effect of delayed cord clamping versus early cord clamping on haematocrit & serum bilirubin in term low birth weight neonates.

OBJECTIVES-

- To study the Haematocrit value at 4 hours of birth in Early cord clamping(ECC)versus Delayed cord clamping(DCC) group.
- To study the levels of haematocrit and Serum bilirubin on 8th day of life in Early cord clamping(ECC) versus Delayed cord clamping(DCC) group.

MATERIALS AND METHODS-

Study population: 100 term low birth weight neonate(<2.5 kg) born at Government general hospital, Siddhartha medical college, Vijayawada. Type of study : Hospital based comparative study with 1:1 distribution in two groups Duration of study : November 2021 to April 2022.

METHODOLOGY- 100 low birth weight term neonates born in Siddhartha medical college was taken in the study.

- New born babies falling under exclusion criteria was not considered.
- The consent was taken from the mother before performing study.
- 2 ml blood was taken in EDTA Vial for haematocrit at 4 hrs of birth and 2ml blood was taken in EDTA and plain vial for haematocrit and serum bilirubin level estimation on 8th day.

Results were compared between patients with ECC and patients with DCC.

RESULTS-

- Delayed cord clamping at birth increases neonatal venous haematocrit and haemoglobin within a physiologic range and resulting in improved iron status.
- No significant hyperbilirubinemia were observed among groups.

CONCLUSION-

- Newborns have early haematological advantages of DCC without increase in hyperbilirubinemia.
- This practice has been shown to be safe, simple and should be implemented to prevent early neonatal anaemia.

KEYWORDS : Term low birth weight neonates, delayed versus early cord clamping, serum bilirubin, haematocrit.

INTRODUCTION

- Early cord clamping (ECC) - Clamping within 1 min after birth.
- Delayed cord clamping - Clamping after 1 min of delivery, or after cessation of cord pulsations¹.

Advantage of delayed cord clamping (DCC) is prevention of neonate iron deficiency, a condition that is associated with suboptimal neurodevelopment. Placental transfusion of 80-100 ml of blood will supply 40 to 50 mg/kg of additional iron to the basal stores of 75 mg/kg of body iron in a newborn term neonate. Delayed cord clamping at birth increases neonatal mean venous haematocrit within a physiologic range.

There was a marked decrease in blood volume from 126 to 89 ml/kg during the first 4 hours in neonates so that the venous haematocrit rose from 48 % at birth to 64 % by 4 hours.Placental transfusion, by increasing red cell volume, greatly enhanced the severity of neonatal hyperbilirubinemia. Bilirubin concentrations of 15 mg/dl developed in only 6% of premature neonates when cord clamping was immediate, in 14% when cord clamping was delayed 1 minute.

NEED FOR STUDY-

Many studies have been done on preterm neonates and term neonates

but few studies have been done on term low birth weight neonates.

- Advantages of DCC :
 - Increases blood volume
 - Decreases frequency of blood transfusion
 - Decrease in incidence of intracranial haemorrhage
 - Decrease in frequency of iron deficiency anemia.

INCLUSION CRITERIA-

- All the term babies birth weight less than 2500 grams
- Apgar score >7 at one minute
- Normal fetal heart rate during intrapartum and postpartum period

EXCLUSION CRITERIA-

- ABO incompatibility
- Rh incompatibility
- Neonate of diabetic mother
- Cyanotic congenital heart disease
- Twin deliveries
- Birth asphyxia

RESULTS-

A total of 148 antenatal mothers with term gestation with growth scan showing low birth weight fetuses were selected for study in Siddhartha

medical college, Vijayawada between November 2021-April 2022. By simple random sampling, half of them(74) were done early cord clamping and other half were done delayed cord clamping.

Based on neonatal examination and investigations, some neonates were excluded from the study as they were having ABO/ Rh incompatibilities or cyanotic congenital heart disease or birth asphyxia. After excluding these neonates finally 50 neonates were selected from each group and their haematocrit values were studied at 4 hours and 8 days of life, and serum bilirubin levels were studied at 8 days of life.

COMPARISON OF HAEMATOCRIT BETWEEN EARLY CORD CLAMPING AND DELAYED CORD CLAMPING GROUPS AT 4 HOURS OF LIFE:

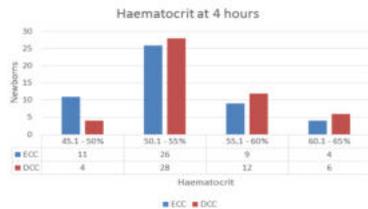


FIGURE 1: COMPARISON OF HAEMATOCRIT BETWEEN EARLY CORD CLAMPING AND DELAYED CORD CLAMPING GROUPS AT 4 HOURS OF LIFE

In early cord clamping group, 11 babies(22%) were having haematocrit between 45.1-50%, 26 babies (52%) between 50.1-55%, 9 babies(18%) between 55.1-60% and 4 babies(8%) between 60.1-65% as shown in figure 1.

In delayed cord clamping group, 4 babies(8%) were having haematocrit between 45.1-50%, 28 babies (56%) between 50.1-55%, 12 babies(24%) between 55.1-60% and 6 babies(12%) between 60.1-65% as shown in figure 1.

Haematocrit values at 4 hours of life was compared between 2 groups and result showed there was increased haematocrit values in delayed cord clamping group but within physiological limits.

COMPARISON OF HAEMATOCRIT BETWEEN EARLY CORD CLAMPING AND DELAYED CORD CLAMPING GROUPS AT 8 DAYS OF LIFE:

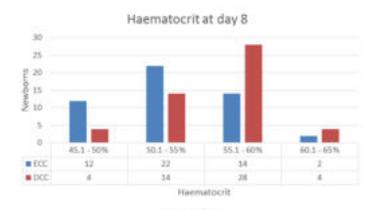


FIGURE 2: COMPARISON OF HAEMATOCRIT BETWEEN EARLY CORD CLAMPING AND DELAYED CORD CLAMPING GROUPS AT 8 DAYS OF LIFE

In early cord clamping group, 12 babies(24%) were having haematocrit between 45.1-50%, 22 babies (44%) between 50.1-55%, 14 babies(28%) between 55.1-60% and 2 babies(4%) between 60.1-65% as shown in figure 2.

In delayed cord clamping group, 4 babies(8%) were having haematocrit between 45.1-50%, 14 babies (28%) between 50.1-55%, 28 babies(56%) between 55.1-60% and 4 babies(8%) between 60.1-65% as shown in figure 2.

Haematocrit values at 8 days of life was compared between 2 groups and result showed there was increased haematocrit values in delayed cord clamping group but within physiological limits.

COMPARISON OF SERUM BILIRUBIN LEVELS BETWEEN EARLY CORD CLAMPING AND DELAYED CORD CLAMPING GROUPS AT 8 DAYS OF LIFE:

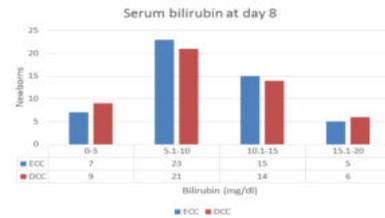


FIGURE 3: COMPARISON OF SERUM BILIRUBIN LEVELS BETWEEN EARLY CORD CLAMPING AND DELAYED CORD CLAMPING GROUPS AT 8 DAYS OF LIFE.

In early cord clamping group, 7 babies(14%) were having serum bilirubin levels between 0-5mg/dl, 23 babies (46%) between 5.1-10mg/dl, 15 babies(30%) between 10.1-15mg/dl and 5 babies(10%) between 15.1-20mg/dl as shown in figure 3.

In delayed cord clamping group, 9 babies(18%) were having serum bilirubin levels between 0-5mg/dl, 21 babies (42%) between 5.1-10mg/dl, 14 babies(28%) between 10.1-15mg/dl and 6 babies(12%) between 15.1-20mg/dl as shown in figure 3.

Groups	Range	Mean± standard deviation	t-value	p-value	
PCV(%)	DCC	46.4-64.5%	56.47 ± 3.96%	4.131	0.000038
	ECC	45.1-62.2%	53.02 ± 4.29%		
Total bilirubin(mg/dl)	DCC	4.0-17.9	9.50±4.00	0.05	0.479
	ECC	3.6-17.6	9.46±3.79		

FIGURE 4: Statistical representation of different groups

At 8 days of life, in the DCC group maximum number(56%) of neonates had haematocrit between 55.1-60% whereas in ECC group maximum number of neonates (44%) had haematocrit between 50.1-55%.

In the DCC group maximum number(42%) of neonates had total bilirubin between 5.1-10mg/ dl, which falls under low risk group of Bhutani chart. In ECC group maximum number of neonates (46%) had total serum bilirubin between 5.1-10mg/dl which falls under the low risk category of Bhutani chart.

The independent T-test showed statistically significant difference between the DCC(mean=56.47 ± 3.96%) and ECC group (mean=53.02 ± 4.29%) PCV Samples (t= 4.131, p= 0.000038). There is no statistically significant difference between the DCC group (mean=9.50±4.00mg/dl) and ECC group (mean=9.46±3.79) total serum bilirubin samples (t=0.05, p=0.479).

DISCUSSION-

The aim of this study was to compare the haematocrit and serum bilirubin levels between early and delayed cord clamping groups in term LBW neonates. Venous hematocrit was found to be higher in the delayed cord clamping group than in neonates who had undergone early cord clamping after birth. The mean hematocrit in DCC was found to be 56.47 ± 3.96% and 53.02 ± 4.29% in the ECC group and the difference was found to be statistically significant (p = <0.001). A randomized controlled trial shows greater hematocrit level in delayed cord clamping group with statistical significance². Another randomized trial demonstrated increase in mean hematocrit level significantly in DCC group³.

DCC helps in placental blood transfusion. So chance of hyperbilirubinemia is expected which has prevented many obstetrician to adopt DCC. In our study in the DCC group maximum number of neonates (42%) had serum bilirubin level within 5.1mg/dl – 10mg/dl. They were in low risk zone of Bhutanichart and it was seen that 2 neonates had total bilirubin above 17.5mg/dl which made them fall under high-risk group of Bhutani chart. They were managed by phototherapy and none of the neonates required exchange transfusion. In ECC group maximum number of neonates (46%) had total bilirubin serum between 5.1-10mg/dl which were in the low risk category of Bhutani chart and 1 neonate had total bilirubin more than 17.5 mg/dl in the ECC group which came under high-risk group and managed by phototherapy. The mean total bilirubin in the DCC group was found to be 9.50±4.00 mg/dl and 9.46±3.79 mg/dl in the ECC group, (p=0.479)

which is not statistically significant. There is no significant difference in neonatal polycythemia, hyperbilirubinemia or rate of phototherapy^{4,5} and no increased rate of neonatal jaundice and polycythemia⁶. Therefore we concluded that DCC improves the hematological outcome of the neonate without increasing the risk of polycythemia and hyperbilirubinemia. The limitation of our study is that this is a single centre study and only the immediate effect of DCC has been observed. Large multicentric studies with delayed effects of DCC should be carried out.

CONCLUSION-

There is no significant increased risk of hyperbilirubinemia between delayed cord clamping group and early cord clamping group. Delayed cord clamping is not associated with any harmful effects on new-born rather has beneficial effects in increasing in the hematocrit.

CONFLICT OF INTEREST-

The authors declare no conflict among them.

REFERENCES-

- 1) Andersson, O. 2013. Effects of Delayed versus Early Cord Clamping on Healthy Term Neonates. Acta Universitatis Upsaliensis. Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine 893. 66 pp. Uppsala. ISBN 978-91-554-8647-1.
- 2) De Bernardo, Maurizio Geordano, Rita De Santis, et al., A Randomized controlled study of immediate versus delayed umbilical cord clamping in neonates born by elective caesarean section, Ital J Pediatr. 2020; 46:71 doi.org/10.1186/s13052-020-00835-2.
- 3) Chen X, Li X, Chang Y, Li W, Cui H (2017) Effect and safety of timing of cord clamping on neonatal hematocrit values and clinical outcomes in term neonates: a randomized controlled trial. J Perinatol. 2017; 38(3):251-7. doi.org/10.1038/s41372-017-0001-y.
- 4) J. Mercer, D. Erickson-Owens, J. Collins, et al., Effects of delayed cord clamping on residual placental blood volume, hemoglobin and bilirubin levels in term neonates: a randomized controlled trial, J. Perinatol. 2017; 37: 260-4. doi.org/10.1038/jp.2016.222.
- 5) Chaitra Ravishankar, Ratan K. Das, Chandra B. Dalal, Tapan Pattanaik, et al., Effect of Early versus Delayed Cord Clamping on Hematological Parameters of Term Neonates; a randomized controlled trial, inajog.com/index.php/journal/article/1618/747.
- 6) C. Fenton, N.L. McNinch, A. Bieda, et al., Clinical outcomes in preterm neonates following institution of a delayed umbilical cord clamping practice change. Advances Neonatal Care. 2018; 18: 223-31. doi.org/10.1097/anc.0000000000000492.