

# Effect on Neonatal Hemoglobin and Hematocrit in Early Versus Delayed Cord Clamping

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## ABSTRACT

**Aim:** To study effect on neonatal hemoglobin and hematocrit in early versus delayed cord clamping.

**Study design:** Randomized controlled trial

**Place and duration:** Gynecology & Obstetrics Lady Aitchison Hospital Lahore from 1<sup>st</sup> July 2016 to 31<sup>st</sup> January 2017

**Methods:** Total 450 neonates after a low risk pregnancy were included in study. After obtaining written parental consent, newborn were randomly assigned to group 1 i.e. early cord clamping (<10 seconds after delivery) and group 2 i.e., delayed cord clamping (>180 seconds after delivery). Infants venous samples were taken after 6 and 24 hours of birth to measure neonate hemoglobin and hematocrit level.

**Results:** Mean venous hemoglobin and hematocrit values were taken at 6 hours and 24 hours after birth. Hematocrit at 6 hours of age in ECC group were 51.0±2.9, and in the late LCC were, 55.0±3.1 and neonatal hemoglobin was 16.8±1.0 in group I and 17.7±1.0 in group II. Statistical analysis was done and p value was calculated which was found to be <0.01.

**Conclusion:** Neonatal mean venous hemoglobin and hematocrit levels were increased in delayed cord clamping versus early cord clamping, but it was within normal physiological range. Delayed cord clamping seems to reduce incidence of neonatal anemia at 6 and 24 hrs of life.

**Keywords:** Early cord clamping, Delayed cord clamping, Hemoglobin, Hematocrit

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## INTRODUCTION

Iron deficiency anemia is significant health problem affecting young population worldwide and it is associated with many adverse effects mainly poor brain development. In Pakistan, reported prevalence of iron deficiency anemia in children under 5 year is 40 to 70 percent <sup>1</sup>Iron plays a vital role in neurodevelopment by formation of myelin sheath, dendrites <sup>2</sup>. Iron deficiency is associated with abnormal cognitive, language, motor and psychomotor development<sup>3,4</sup>. Therefore it is important to prevent iron deficiency anemia in neonates for proper mental development. After birth, neonate receives excessive blood transfusion from placenta. Neonate receives 80ml of blood within first minute and 100 ml of blood at three minutes after delivery<sup>5</sup>. This extra amount of blood provides iron to neonate and it can prevent iron deficiency anemia during first few years of life<sup>6</sup>.

Hypothesis of this study is based on this theory that late cord clamping might help to provide extra amount of placental blood flow to newborn. Late cord clamping is basically defined as clamping of umbilical cord 3 minutes after birth. Different surveys and researches showed large difference in cord clamping timing. In those surveys, early cord clamping was seen as preferable practice<sup>7</sup>. So we conducted this study to find effect of timing of cord clamping on neonatal hemoglobin and hematocrit.

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## MATERIALS AND METHODS

This randomized controlled trial study was conducted at Gynaecology and Obstetrics Lady Aitchison Hospital Lahore from 1<sup>st</sup> July 2016 to 31<sup>st</sup> January 2017. Four hundred and fifty male/female full term newborns with uneventful antenatal history and their mothers hemoglobin >11g/dl were included in the study and their demographic information obtained. Patients with maternal diabetes, preeclamptic women, IUGR and newborns who needed resuscitation and patients with congenital anomalies and any other complications at birth were excluded. Out of four hundred and fifty patients, 225 patients were included in Group-I that is early cord clamping (ECC) group (<10 seconds after delivery) and 225 patients were included in late cord clamping (LCC) group II (>180 seconds after delivery). Cord clamping technique was kept same in both groups and clamping was done by umbilical cord clamp and the two techniques were compared.

Immediately after birth the baby was kept in a tray which was held at the level of introitus. Newborn was given immediate care by warming wrapping and drying with sterile sheet and was clinically examined. In both groups after early and delayed cord clamping, Blood was taken from a peripheral vein of the newborn and was sent for venous hematocrit and hemoglobin. Blood was collected in a CBC vial. Birth weight and length of the baby recorded also. The information collected and analyzed in SPSS 21 with 80% test of power and 5% level of significance.

Respective P-value, 95% confidence interval considered to determine level of significance

## RESULTS

Among 450 selected pregnant females, 225 were in group I and 225 in group II. Average clamping time for ECC group was (<10 seconds after delivery) and in LCC group (>180 seconds after delivery). Hematocrit at 6 hours of age in ECC group was  $51.0 \pm 2.9$ , and in the late LCC was,  $55.0 \pm 3.1$  and neonatal hemoglobin was  $16.8 \pm 1.0$  in group I and  $17.7 \pm 1.0$  in group II. Result showed that the difference between early and late group in Hb% and hematocrit was highly significant (Tables 1-2).

Table 1: Haemoglobin and haematocrit level of neonate at 6 hour in group I (ECC) and group II (LCC)

Hemoglobin & hematocrit values	Group I (ECC) mean $\pm$ SD (CI 95%)	Group II (LCC) mean $\pm$ SD (CI 95%)	p value
Haemoglobin of neonate at 6 hours	16.8 $\pm$ 1.1 (16.7-16.9)	17.7 $\pm$ 1.0 (17.61-17.79)	0.001
Hematocrit of neonate at 6 hours	51 $\pm$ 2.9 (50.73-51.27)	55 $\pm$ 3.1 (54.71-55.29)	0.001

Table 2: Haemoglobin and haematocrit level of neonate at 24 hour in group I (ECC) and group II (LCC)

Hemoglobin & hematocrit values	Group I (ECC) mean $\pm$ SD (CI 95%)	Group II (LCC) mean $\pm$ SD (CI 95%)	p value
Haemoglobin of neonate at 6 hours	15.3 $\pm$ 0.9 (15.22-15.38)	16.6 $\pm$ 0.9 (16.52-16.6)	0.001
Hematocrit of neonate at 6 hours	49 $\pm$ 2.0 (48.82-49.18)	52 $\pm$ 3.6 (51.67-52.33)	0.001

## DISCUSSION

Early ligation of cord is common practice. But theory on flow of extra amount of blood after few minutes of delivery supported beneficial effect of delayed cord clamping on neonate. This study also showed marked increase in hemoglobin and hematocrit in late cord clamping than with early cord clamping. These findings were similar in other studies as well<sup>8</sup>. But some researchers showed that delayed umbilical cord clamping is associated with high risk of neonatal polycythemia, respiratory symptoms, jaundice, and other disorders<sup>9</sup>. By taking in view of above consideration we conducted this study to see the effect of early (<10 seconds after delivery) and delayed cord clamping (>180 seconds after delivery) on neonatal anemia. Hematocrit at 6 hours of age in ECC group were,  $51.0 \pm 2.9$ , and in the late LCC were,  $55.0 \pm 3.1$  and neonatal hemoglobin was  $16.8 \pm 1.0$  in group I and  $17.7 \pm 1.0$  in group II. Result showed that the difference between early and late group in Hb% and hematocrit was highly significant. A study done by Cernadas et al 2006 with studied two hundred seventy-six newborns in three group, i.e. clamping at 15, 30 and 180 seconds.

According to this study, hematocrit of <45% (anemia) was significantly lower at 30 second clamping and 3 minutes clamping as compared to clamping at 15 seconds. So they found out that delayed cord clamping at birth increases neonatal hematocrit, but this increase is within a physiologic range<sup>10</sup>. Same study from India reported higher infant Hb at 3 months age in the delayed cord clamping group (9.9 g/dl) versus early clamping group (8.8 g/dl)<sup>11</sup>.

A Bangladeshi study reported that delayed clamping helps to decrease the frequency of neonatal anemia. This practice has been shown to be safe and should be practiced to decrease neonatal anemia<sup>12</sup>. However further research is required to demonstrate effect of delayed cord clamping on neonatal total body iron and bilirubin level.

## CONCLUSION

Delayed cord clamping helps to reduce incidence of neonatal anemia at 6 and 24 hours of life and this practice should be taken into account to increase neonatal hemoglobin and hematocrit levels at birth.

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