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ORIGINAL ARTICLE

# A Comparative Study of Early and Delayed Cord Clamping and its Affect on Neonatal Anemia in Term Babies

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## ABSTRACT

**Introduction:** Controversy exists about the optimal time when to clamp the umbilical cord after the birth of the baby. The most important points of difference relate to maternal and infant safety. In most of the countries, majority of obstetricians and midwives clamp umbilical cord immediately after birth. In poorly resource areas immediate clamping of umbilical cord deprived the infant from increasing its iron stores which are enhancing free of cost. This study was designed to see the effect of early and delayed clamping on neonatal anemia.

**Objectives:** This study was designed to compare the neonatal anemia in early and delayed cord clamping in term babies.

**Methodology:** Randomized controlled trial was carried out over a period of six months from 1-7-2013 to 31-12-2013 at Department of Obstetrics and Gynaecology Lady Willingdon Hospital Lahore. 420 cases were admitted in the labour ward, fulfilling the including criteria were included in the study. After taking the informed consent patients were divided in two equal groups randomly by using random number table. Haematocrit was noted of infants six hours after birth having early cord clamping within 15 seconds and late cord clamping at one minute after the birth.

**Results:** In group A (early clamping) the average age of the mothers was  $27.45 \pm 3.8$  years with age range of 20 years (20-40) years. In group B (delayed clamping) the mean age of mothers was  $27.9 \pm 4.2$  years with age range 20 years of age (21-40) years. In group A the average gestational age was  $38.80 \pm 0.65$  weeks with gestational amenorrhea range 2 weeks (38-40) weeks. In group B the mean gestational amenorrhea was  $38.79 \pm 0.65$  weeks with gestational amenorrhea range 2 weeks (38-40) weeks. As long as neonatal anemia was concerned, in early cord clamping group 35 (16.7%) babies had Haematocrit < 45% and in delayed cord clamping group only 13 (6.2%) of the babies had Haematocrit < 45% using chi-square statistical test, the frequency of Haematocrit < 45% was highly significantly less in delayed cord clamping group as compared to early cord clamping group, i.e. p-value= 0.001.

**Conclusion:** It was concluded, that there were less chances of neonatal anemia in delayed cord clamping as compared to early cord clamping in term infants, p-value 0.001. So the delayed cord clamping should be adopted in our setup to reduce the frequency of anemia in children.

**Key words:** Cord clamping, infants Hb, neonatal anemia.

## INTRODUCTION

The most prevalent and oldest intervention at the time of the birth is the clamping and cutting of the umbilical cord. Despite this fact, the optimal timing of cord clamping has been a controversial issue since long<sup>1</sup>. In the absence of any formal guidelines, in the west most of the obstetricians clamp and cut the cord immediately after the birth of the baby, however, this practice is not applicable universally<sup>2</sup>.

It has been seen that at term, feto placental circulation contain approximately 25% to 60% (54-

160 ml) of the total blood volume and 60% of the fetal red cells are found in it<sup>3</sup>. This blood is also rich in hematopoietic stem cells<sup>4</sup>. In few earlier studies, it has been suggested that early cord clamping within 5 to 10 seconds of birth, deprives the neonate about 20 to 40 ml of the blood/kg body weight, if it is clamped after this time, moreover, 30 to 35 mg of iron is also reduced<sup>5</sup>. There are also suggestions, that early cord clamping leads to increased risk of hypovolemic damage and iron loss in the newborn, and due to the loss of hematopoietic stem cells they are more

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prone to develop type 2 diabetes and several blood disorders<sup>6</sup>.

It has been postulated that early cord clamping is a major cause of anemia in the infants and it is being recommended by few researchers that late cord clamping as low cost intervention for reduction of anemia in the 6 months of life<sup>7</sup>. Those who are in favour of late cord clamping believe that, extra amount of blood volume in the neonatal circulation is harmful, and this overloading increases the likelihood of neonatal jaundice, respiratory distress and polycythemia<sup>8</sup>. However, these harmful effects are not proved by any randomized controlled trial.

As a component of the active management of third stage of labour early clamping of the cord, assist in the delivery of placenta, and it has been shown in Cochrane review to significantly reduce the maternal blood loss after the birth of the baby<sup>9</sup>. In a recent Cochrane review of late cord clamping in the preterm babies there were potential benefits of decreased blood transfusions and less chances of intraventricular haemorrhages<sup>10</sup>. But in the term infants no strong evidence for the superiority of either clamping strategy has been observed<sup>11</sup>. However, these studies were based upon small number of enrolled infants. A well designed trial published in 2006, done a combined trial in preterm and term infants and proved a definite benefit of late cord clamping especially in developing countries<sup>12</sup>.

By studying the comparison of early and late cord clamping, extend of the anemia can be noted, if late clamping of umbilical cord will protect infant from anemia of infancy, it can be adopted as a preventive policy. Pakistan is an underdeveloped country and resources are scarce, poverty and lack of quality diet keep mothers malnourished, hence babies born to these mothers are more prone to develop anemia, this study was also aimed to develop an effective strategy to reduce anemia at the time of birth and an application of an intervention which could reduce the incidence of anemia in the term infants.

### METHODOLOGY

This randomized controlled trial was carried out at Department of Obstetrics and Gynaecology unit 3 Lady willingdon Hospital Lahore, over a period of 6 months from 1-7-2013 to 31-12-2013. 420 cases were admitted in the labour ward, fulfilling the including criteria were included in the study. 210 in each group was selected with

90% power of test, 1% level of significance taking expected % age of anemia (Haematocrit <45%) i.e.; 8.9% in early cord clamping and 1.1% in delayed cord clamping.

**Inclusion Criteria** was Patient's having age between 20-40 years, Singleton pregnancy, Gestational age 37 weeks or more confirmed by ultra-sound, Patients hemoglobin > 10gm/dl.

**Exclusion Criteria** was patients with Diabetes mellitus, Eclampsia, Intra uterine growth retarded (IUGR) babies and Congenitally malformed babies. Their demographic profile was noted. Haematocrit was noted of infants six hours after birth having early cord clamping 15 seconds and late cord clamping at one minute.

Date was analyzed by using SPSS version 11.0 Quantitative variables like, age of mothers, gestational age was presented as Mean  $\pm$  SD. Qualitative variables like anemia (yes/no) was presented as frequency and percentage.

Chi-square test was used to compare frequency of anemia in both groups. P-value  $\leq$  0.05 was considered as significant.

### RESULTS

In this trial compared neonatal anemia in early and delayed cord clamping in 420 babies delivered at term. Neonates were divided into 2 groups in group A early clamping was done in 210 neonates and delayed clamping was in 210 neonates. So in this study there was 138 (32.9%) mothers whose age was 20-25 years, 150 (35.7%) mothers were 25-30 years old, 119 (28.3%) were 30-35 years old and only 13 (3.1%) mothers were 35-40 years of age. The mean age of all mothers was  $27.41 \pm 3.67$  years with 20 years of age range (20-40) years. Moreover, in Group A the average age of the mothers was  $27.45 \pm 3.8$  years with age range of 20 years (20-40) years. In group B the mean age of mothers was  $27.9 \pm 4.2$  years with age range 20 years of age (21-40) years. According to the gestational age, the average gestational was  $38.78 \pm 0.65$  weeks with gestational age range 2 years (38-40) years. Furthermore, in group A the average gestational age was  $38.80 \pm 0.65$  weeks with gestational amenorrhea range 2 weeks (38-40) weeks. In group B the mean gestational amenorrhea was  $38.79 \pm 0.65$  weeks with gestational amenorrhea range 2 weeks (38-40) weeks.

According to the neonatal anemia, in early cord clamping group 35 (16.7%) babies had Haematocrit < 45% and in delayed cord clamping

group only 13 (6.2%) of the babies had Haematocrit < 45%. Using chi-square statistical test, the frequency of Haematocrit < 45% was highly significantly less in delayed cord clamping group

as compared to early cord clamping group, i.e. p-value=0.001.

**Table 1:** Descriptive Statistics of Age of Mothers (years) and gestational Amenorrhea in both study groups

		Study	Groups	Total
		A	B	
<b>Age (years)</b>	<b>N</b>	210	210	420
	<b>Mean</b>	27.44	27.9	27.67
	<b>Std. Deviation</b>	3.8	4.20	4.0
<b>Gestational Amenorrhea</b>	<b>N</b>	210	210	420
	<b>Mean</b>	38.80	38.79	38.78
	<b>Std. Deviation</b>	0.65	0.65	0.67

**Key words:** Study Group A: Early cord clamping , Study Group B: Delayed cord clamping

**Table 2:** Comparison of Neonatal Anemia (Haematocrit < 45%) among study groups

		Neonatal Anemia or Haematocrit (<45%)		Total
		Yes	No	
<b>Study Groups</b>	<b>Early</b>	35 (16.7%)	175(83.3%)	210(100%)
	<b>Delayed</b>	13 (6.2%)	197(93.8%)	210(100%)
	<b>Total</b>	48(11.4%)	372(88.6%)	420(100%)
p-value		0.001		

Study Group A: Early cord clamping , Study Group B: Delayed cord clamping

## DISCUSSION

Controversies surrounds around the timing of cutting and clamping of umbilical cord after the birth of the baby<sup>13</sup>. In the western countries, the current approach is that most of the obstetricians and midwives clamp and cut the umbilical cord within the first 10-15 seconds after birth, however, this approach lacks any strong evidence .In most of the countries especially in developing part of the world the usual practice is to clamp the cord between 1 to 3 minutes after birth<sup>14</sup>. A current systematic review confirms the benefit of delayed cord clamping as long as the prevention of neonatal anemia is concern<sup>1</sup>. The cause for this effect is based on the fact that after birth the newborn is delivered with a placental transfusion of 80 ml and 100ml of blood at one minute after and three minutes after birth, this volume will supply 40 to 50 mg /kg of extra iron to the 75mg/kg of body iron that newborn term infants have, reaching a total of 115 to 120 mg/kg, which might prevent iron

deficiency in the first year of life <sup>15</sup>. In the early years of life iron deficiency leads to many effects like cognitive impairment<sup>16</sup>. On the other hands it has been suggested by few observational studies that delayed umbilical cord clamping can leads to respiratory symptoms ,Polycythemia and neonatal hyperbilirubinemia<sup>17</sup>.

By keeping in mind the above consideration we conducted this study to see the effect of early (15 seconds) and delayed (1 minute) cord clamping on neonatal anemia. A similar research conducted by Cernadas JMC et al 2006 with same objectives, they studied two hundred seventy-six newborns in three group, i.e. clamping at 15, 30 and 180 seconds. According their findings the frequency of Haematocrit at <45% (anemia) was significantly lower at 30 second clamping and 3 minutes clamping as compared to clamping at 15 seconds. So they concluded that there was an increase in neonatal mean haematocrit in the babies in which delayed cord clamping was done<sup>18</sup>.

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In another study conducted by Jaleel R et al 2009 on the timing of umbilical cord clamping, it was proved that the mean neonatal Hb was significantly higher in the delayed clamping group as compared to early clamping group. Incidence of neonatal anemia was also remarkably lower in the delayed clamping group<sup>19</sup>. A similar study which was conducted in India suggested that at 3 months of the age the infant HB was 9.9g/dl in the delayed cord clamping group in comparison with early clamping group it was 8.8 g/dl<sup>20</sup>. As shown by our study early cord clamping group 35 (16.7% babies had haematocrit < 45% and in delayed cord clamping group only 13 (6.2%) of the babies had haematocrit < 45%. Using chi-square statistical test, it is concluded that the frequency of haematocrit <45% was highly significantly less in delayed cord clamping group, i.e.-value = 0.001

In addition, it was proved in other studies that neonates were devoid of Polycythemia-related harmful effects, and all Polycythemic newborns were symptoms free<sup>21</sup>.

A Bangladeshi study reported that delayed clamping helps to decrease the frequency of neonatal anemia. This was considered to be a safe measure to increase neonatal hemoglobin and haematocrit values at birth<sup>22</sup>. Therefore, in full term neonates delayed cord clamping is associated with an increase in Hb level, without any complication or side effect. It is therefore recommended as a simple and cost free intervention for reducing prevalence of anemia in infants especially in developing countries.

### CONCLUSIONS

It is concluded that there are less chances of neonatal anemia in delayed cord clamping as compared to early cord clamping in term infants, p-value 0.001. So the delayed cord clamping should be adopted in our setup to reduce the frequency of anemia in children.

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