

Clamping Time and Its Effect on Mothers and Their Full Term Newborns

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Abstract: The umbilical cord of every newborn is clamped and cut at birth, yet the optimal timing for this intervention remains controversial. The aim was to explore the effects of clamping time on mothers and their full term newborns. The Design a quasi-experimental (time series) was used for this study. Settings: study was conducted at labor & delivery units in El- Menoufia University Hospital, Shebin El-kom Teaching Hospital, and New General Bagour Hospital. The Participants of this study were 100 parturient women and their full term newborns after gaining their acceptance. Tools were: 1st a structured interview questionnaire of socio-demographic data and obstetric history, 2nd structured assessment tool for mothers and newborn laboratory outcomes, 3rd Apgar score (Verginia Apgar). The results of the present study revealed statistically significant difference regarding duration of third stage of labor. There were no statistically significance differences of mother's hematocrit, or hemoglobin among early and delayed cord clamping groups at birth and at 24 hours later. In contrast there were a significance difference between cord-clamping time for hemoglobin, hematocrite, RBCs and ferritin level at birth for newborns and highly statistically significant difference after 24hrs for delayed cord clamping group. This elevation was within the prespecified physiologic range. So, they weren't in need for admission to Intensive Care Unit due to hyperbilirubinemia. It can be concluded that delaying clamping of the cord for more than one minute to three minutes doesn't increase the risk of maternal postpartum hemorrhage. In addition, late cord clamping can be advantageous for the newborn by improving hemoglobin, hematocrit and ferritin values. It is recommended that delayed clamping should be practiced and supported by university hospitals, ministry of health and population (MOHP) and hospital administration. Increasing awareness of the routine delayed clamping by obstetricians, midwives and pediatricians. Future research may be helpful in refining the timing of clamping by determining the minimum time required to provide maximum benefit associated with placental transfusion.

Keywords: Clamping Time, Mothers, Full Term Newborns.

I. Introduction

Early cord clamping was part of the WHO, 2007 protocol for preventing maternal post partum hemorrhage (PPH), leading many practitioners to believe that late cord clamping (LCC) might increase maternal bleeding. However, studies have found that there is no evidence for significant risks to the mother or the newborn associated with delaying cord clamping by 2-3 minutes ⁽¹⁾. Accordingly WHO (2009) ⁽²⁾ modified their protocol to reflect this evidence

Moreover immediate cord clamping is associated with inadequate iron stores for normal development which may have an "irreversible impact on developing brain despite oral iron supplementation. Iron deficiency in infancy can lead to neurologic issues in older children such as poor school performance, decreased cognitive abilities, and behavioral problems ⁽³⁾. Recommendation for WHO (2012) ⁽⁴⁾ is based on the understanding that a delay in clamping the cord allows continued passage of blood from the placenta to the newborn for an additional 1 to 3 minutes after birth. This brief delay is known to increase the iron stores of the young infant by over 50% at 6 months of age among full term newborn.

Therefore delayed cord clamping may be particularly beneficial to newborns in developing countries with poor resource environments because it is a safe and inexpensive way to prevent infant anemia ⁽⁵⁾. Also, it is recommended in countries where severe anemia of the mother and newborn is common, and in countries where blood transfusions are not readily available. Delayed cord clamping should be considered for all infants regardless of gestational age. Using gravity for added blood transfusion after the cord has stopped pulsing would be particularly beneficial in order to ensure the maximum amount of placental blood is reaching the newborn ⁽⁵⁾.

The newborn may have been placed on the mother's abdomen, put to the breast or have been more closely examined on a warmed cot if resuscitation is required as a part of early cord clamping strategy ⁽⁶⁾. Once the placenta is felt to have separated from the wall of the uterus, downward traction may have been applied to the remaining length of the umbilical cord to assist delivery of the placenta. Controlled cord traction is believed

to reduce blood loss, shorten the third stage of labor and therefore minimize the time during which the mother is at risk from hemorrhage⁽⁷⁾.

In addition there is no evidence of differences in blood loss for the mothers, in case of the need for manual removal of the placenta or the use of uterotonics in early versus late clamping of the umbilical cord⁽⁸⁾. Early cord clamping (less than 1 minute after birth) should be performed only when the newborn requires resuscitation with positive-pressure ventilation. However, if the provider has experienced providing effective positive-pressure ventilation without cutting the cord, ventilation can be initiated with the cord intact to allow for delayed cord clamping⁽³⁾.

The most recent international guidelines for resuscitation and stabilization of newborns recommend delaying umbilical cord clamping for at least one minute, unless the infant requires immediate resuscitation after birth. Also, continued placental circulation increase blood volume for the cardiac output and the lungs from 8-10% (fetal state) to achieve full perfusion of the pulmonary capillary and 45-55% of the cardiac output (neonatal). The distribution of blood to the neonate is also thought to circulate to other structures that become much more active, such as the diaphragmatic and chest muscles, liver, kidneys and gut⁽⁹⁾.

Stem cells play an essential role in the development of the respiratory, cardiovascular, central nervous and immune systems among many other functions as well as have miraculous healing properties. The concentration of stem cells in fetal blood is higher than at any other time of life. Immediate cord clamping leaves nearly one-third of these critical cells in the placenta⁽¹⁰⁾. So, delayed cord clamping lead to quickly facilitate umbilical cord banking.

Currently there are no formal clinical guidelines for the timing of umbilical cord clamping, the amount of time between birth and cord clamping is a decision made by the individual provider based largely on personal preference. It is essential for midwives and other obstetric providers to establish a clear definition of delayed cord clamping, along with a set of clinical guidelines⁽¹¹⁾. The coverage for this intervention has been limited due to a lack of information about its benefits as well as the practice. The purpose of this brief is to describe the benefits of the intervention and why it is not currently being used, so that cord clamping can be enthusiastically supported and promoted as a best practice by maternal and newborn health team⁽¹²⁾. The risks of umbilical cord clamping on maternal and neonatal outcome remain unknown, and more studies are needed to compare between the two methods of the umbilical cord clamping.

So, previously unclear clinical guidance on performing delayed cord clamping should be integrating as a part of essential newborn care and management of the third stage of labor. Therefore the aim of this study was to explore the effects of clamping time on mothers and their full term newborns.

Research Hypotheses

Mothers and full term newborns outcome will be differ significantly in delayed cord clamping group than in early cord clamping group.

Subjects and methods

a) Research Design

A Quiz- experimental research design (time Series) was used.

b) Research Setting

The study was conducted at three settings: University Hospital, Shebin El-kom Teaching Hospital and New General Bagour Hospital, they are the largest hospitals for flow rate of deliveris.

Sample

Purposive sample was taken from parturient women coming to delivery units during the third stage of labor. Selected women were monitored during labor and opted for timing categorized as early and late umbilical cord clamping during the third stage of labor. Sample was divided into two groups: a study group **1** early clamping group and a study group **2** delayed clamping groups.

The study group **1** (Early cord clamping group) composed of 50 women. Women in this group attended according to service routine, which does not have orientation concerning the late umbilical cord clamping; however, doctors must wait at least 15-30 second before umbilical cord clamping during third stage of labor.

The study group **2** (delayed cord clamping group) composed of 50 women. The women assigned to this group received short and easy understandable information regarding the possible benefits of the late umbilical cord clamping, using copy of real results of lab investigations to explain the differences between the early and late umbilical cord clamping. The women were asked to take her newborn on her abdomen for three minutes after waiting for at least 30 seconds holding the baby 20 cm below the introitus.

Inclusion criteria of the sample were:

- * Third stage of normal labor.
- * Vertex presentation.
- * Primi para.
- * Free from any medical disease.
- * Singleton pregnancy.

Sample size:

The total number was 100 women. The researchers took the sample from different shifts from the selected hospitals.

Sample size was determined on the basis of previous researches (9) and available at <http://www.jofamericanscience.org>⁽¹³⁾. Regarding these research 50 women in early cord clamping group and 50 women in delayed cord clamping group.

The data collection of the study took seven months starting from June 2014 till December 2014 of all available parturient women coming to the previously stated hospital during the third stage of labor.

d) Data collection tools

Three tools were utilized

Tool I: Structured Interview Questionnaire. **It was developed by the researchers. It was devoted to select the eligible study subjects that fulfill the proposed inclusion criteria. The tool consisted of the following parts.**

Part1. Socio-demographic characteristics which include the followings: age, level of education, and occupation.

Part2. Obstetric history which includes the followings: gestational age, duration of third stage of labor, receiving uterotonics before cord clamping.

Tool II: Structured Assessment Tool for mothers and their newborns: it was developed by the researchers to assess the maternal and newborn outcomes. The tool consisted of the following parts:

Part1. Maternal outcomes which include the followings {maternal blood loss, maternal hemoglobin, and hematocrite (at birth and after 24hrs), manual removal of the placenta and need for blood transfusion}.

Part2. Newborns outcomes which include the followings {Neonatal hemoglobin, hematocrite, ferritin, RBCs and bilirubin at birth and after 24hrs}.

Tool III:

Apgar score (Verginia Apgar). It was adopted from **Calmes (1984)**⁽¹⁴⁾. This tool was used by the researchers to collect the necessary data about the neonatal condition. This tool is determined by evaluating the newborn baby at the first and the fifth minutes after birth on five simple criteria (Appearance, Activity, Pulse, Grimace, and respiration) on a scale from zero to two, then summing up the five values. The researchers used this tool through Apgar score chart.

Scoring items for Apgar score

Normal (7-10)

Mild asphyxia (4-6)

Severe asphyxia (0-3)

Total score = 10

2- Operational design

Pilot Study

Piloting was conducted to test the applicability of the tools, the feasibility of the study and to estimate the time needed for data collection. It was conducted on 10% of the total sample (10 parturient women).

Study maneuver

A. Preparatory phase:

A reviewing of past and current literature covering the various aspects of the problem was done using books, articles, magazines and network. Administrative issues were done.

B. Implementation phase: during natal and postpartum period.

a) During Natal period

- **Interview:** Each interview was completed during the period of 20 minutes in which the researchers collected data related to socio-demographic characteristics and obstetric history.

Intervention: Continuous assessment and monitoring were done during the third stage of labor after delivery of the newborn but before umbilical cord clamping. This was done to perform the main study intervention either early or delayed clamping and withdraw blood sample from the mother and her newborn at birth and after 24hrs.

The women assigned to the study group² received short and easy understandable information regarding the possible benefits of the delayed umbilical cord clamping, and were encouraged to help the researchers to make investigations at birth and after 24hrs to assure her family about both mother and his/her newborn. Also, to explain the differences between the early and delayed cord clamping during third stage of labor and giving them copy of their lab investigations results.

b) During Post natal period

- **Initial Assessment of the newborn condition using Apgar score**

The Apgar score is determined by evaluating the newborn baby at the first and the fifth minutes after birth through using of Apgar score chart.

C. Evaluation: Accomplished by determining the duration of the third stage of labor in relation to clamping time of umbilical cord. The newborn was received and Apgar score was made. Lab investigations were taken from both mothers and their newborns at birth and after 24hrs. Compare results of lab investigations between both study groups.

3. Ethical consideration : Three formal letters were issued from the dean of Faculty of Nursing, Menoufia University to obtain an official approval from the directors of the hospitals to conduct the study. The letters stated the researchers, the title of the study and the aim of the research.

4. Statistical Design: The data collected were tabulated & analyzed by SPSS (statistical package for the social science software) statistical package version 20 on IBM compatible computer. Qualitative data were expressed as number and percent (No & %) then analyzed by applying chi-square test.

II. Results

Concerning distribution of the studied mothers' socio-demographic characteristics, table 1 revealed a comparison between early and delayed umbilical cord clamping groups. There were no statistically significant differences $P>0.05$ regarding women age, about half of them (46.0% and 44.0%) in both early and delayed clamping groups were have 25 to 29 years old. Also, there were in significance differences $P>0.05$ regarding their level of education, or occupation which represented that 46.0% and 32% of women in both groups were have secondary education and 62.0% and 48.0% of women in early and delayed umbilical cord clamping group were housewives respectively.

Table 2 shows a Comparison between early clamping group and delayed clamping group regarding their maternal outcomes at birth. There was no statistically significant difference $P>0.05$ regarding maternal hemoglobin (Hb) and hematocrite (HCT) level at birth. Also, it was obvious that about 70% and 54% of women in early and delayed umbilical cord clamping groups had Hb level ranged from 10 to 12 g/dl, and HCT level ranged from 35 to 47% respectively.

Moreover there was a statistically significant difference at P value 0.004 regarding estimated post partum blood losses (Maternal blood loss). About 72.0% and 42% of women in early and delayed umbilical cord clamping groups had mild post partum blood loss (less than 500ml) respectively. Farther more 28.0% and 58% of women in early and delayed umbilical cord clamping groups had moderate post partum blood loss (500ml but less than 1000ml) respectively.

Table 3 presents a comparison between early and delayed umbilical cord clamping groups regarding their maternal outcome after 24 hrs. The table shows that there was no statistically significant difference regarding maternal hemoglobin (Hb) and hematocrite (HCT) level after 24hrs. Also, about 62% of women in early umbilical cord clamping group had Hb level ranged from 10 to 12 g/dl and HCT level ranged from 35 to 47% respectively. While 48% of women in delayed umbilical cord clamping group had Hb level ranged from 10 to 12 g/dl and HCT level ranged from 35 to 47% respectively.

Table 4 and figure 2 represent a Comparison between early clamping and delayed clamping groups regarding neonatal outcomes at birth. It was found that there were a statistically significant difference at $P<0.05$ regarding neonatal Hb, HCT, RBCs, and Ferritin at birth. While, there were no statistically significant differences regarding Apgar score or neonatal bilirubin level at birth.

Table 5 and **figure1** present a comparison between early and delayed umbilical cord clamping groups regarding their neonatal outcomes after 24hrs. There were highly statistically significant differences at P value < 0.001 regarding neonatal Hb, HCT, RBCs, and ferritin after 24hrs from birth. While there were no statistically significant differences at P value 0.003 regarding neonatal bilirubin after 24 hrs. Also, about 72% and 80% of neonates in both groups had bilirubin ranged from 2 to 5 mg/dl.

Table (1):- Comparison between early clamping group and delayed clamping group regarding their socio-demographic characteristics

Socio-demographic Characteristics	Umbilical cord clamping				X ² Test	P value
	Early clamping n = 50		Delayed clamping n=50			
	No.	%	No.	%		
Age (years)						
20-24 year	7	14.0	10	20.0	0.68	0.87 ^{NS}
25-29 year	23	46.0	22	44.0		
30-34 year	14	28.0	13	26.0		
35-40 year	6	12.0	5	10.0		
Level of education					4.45	0.35 ^{NS}
Illiterate	4	8.0	3	6.0		
Basic education	9	18.0	18	36.0		
Secondary Level	23	46.0	16	32.0		
University	14	28.0	13	26.0		
Occupation					1.46	0.23 ^{NS}
Employee	19	38.0	26	52.0		
Housewife	31	62.0	24	48.0		

Table (2). Comparison between early clamping group and delayed clamping group regarding their maternal outcomes at birth.

Maternal Outcomes (at birth)	Umbilical cord clamping				X ² test	P value
	Early clamping n = 50		Delayed clamping n = 50			
	No.	%	No.	%		
Estimated postpartum blood loss (Maternal blood loss)					8.00*	0.004 S
Mild (blood loss less than 500 ml)	36	72.0	21	42.0		
Moderate (blood loss 500 to less than 1000 ml)	14	28.0	29	58.0		
Severe (blood loss above 1000 ml)	0	0.0	0	0.0		
Maternal hemoglobin					2.08	0.15 NS
Less than 10g/dl	15	30.0	23	46.0		
From 10-12 g/dl	35	70.0	27	54.0		
More than 12 g/dl	0	0.0	0	0.0		
Maternal hematocrite					2.08	0.15 NS
Less than 35%	15	30.0	23	46.0		
From 35-47%	35	70.0	27	54.0		
More than 47%	0	0.0	0	0.0		

Table (3). Comparison between early clamping and delayed clamping groups regarding their maternal outcomes after 24 hrs.

Maternal Outcomes (After 24hrs)	Umbilical cord clamping				X ² test	P value
	Early clamping n = 50		Delayed clamping n = 50			
	No.	%	No.	%		
Hemoglobin level					1.46	0.23 ^{NS}
Less than 10g/dl	19	38.0	26	52.0		
From 10-12 g/dl	31	62.0	24	48.0		
More than 12 g/dl	0	0.0	0	0.0		
Hematocrite level					3.32	0.16 ^{NS}
Less than 35%	19	38.0	26	52.0		
From 35-47%	31	62.0	24	48.0		
More than 47%	0	0.0	0	0.0		

Table (4). Comparison between early and delayed clamping groups on neonatal outcomes at birth

Neonatal Outcomes at birth	Umbilical cord clamping				X ² test	P value
	Early clamping n = 50		Delayed clamping n = 50			
	No.	%	No.	%		
Apgar score (Total score 10)						
Normal (7-10)	33	66.0	42	84.0	3.41	0.06 ^{NS}
Mild asphyxia (4-6)	17	34.0	8	16.0		
Severe asphyxia (0-3)	0	0.0	0	0.0		
Hemoglobin level						
Less than 14.5g/dl	26	52.0	11	22.0	8.41	0.004 ^S
From 14.5 – 18g/dl	24	48.0	39	78.0		
Above 18 g/dl	0	0.0	0	0.0		
Hematocrite level						
Below 43% at birth	27	54.0	11	22.0	9.56	0.002 ^S
From 45- 56% at birth	23	46.0	39	78.0		
Above 56% at birth	0	0.0	0	0.0		
RBCs						
Less than 4.8M/UL	27	54.0	11	22.0	9.56	0.002 ^S
From (4.8-5.5) M/UL	23	46.0	39	78.0		
above 5.5 M/UL	0	0.0	0	0.0		
Total bilirubin count						
0.03 -1.2 mg/dl	18	36.0	11	22.0	1.75	0.19 ^{NS}
2-5 mg/dl	32	64.0	39	78.0		
6-12 mg/dl	0	0.0	0	0.0		
Ferritin						
Less than 12mg/dl or less than 27pmol/L	27	54.0	11	22.0	9.55	0.002 ^S
From 12-150ng/ml or from 27-330pmol/L	23	46.0	39	78.0		
More than 150ng/ml or more than 330pmol	0	0.0	0	0.0		

Table (5): Comparison between early clamping and delayed clamping groups regarding neonatal outcomes after 24 hrs.

Neonatal Outcomes after 24 hrs	Umbilical cord clamping				X ² Test	P value
	Early clamping n = 50		delayed clamping n = 50			
	No.	%	No.	%		
Hemoglobin level						
Less than 14.5g/dl	22	44.0	4	8.0	20.58	< 0.001 ^{HS}
From 14.5 - 22.5g/dl	28	56.0	46	92.0		
Hematocrite level						
Below 45%	22	44.0	4	8.0	20.58	< 0.001 ^{HS}
From 45- 65%	28	56.0	40	80.0		
Above 65%	0	0.0	6	12.0		
Neonatal RBCs						
Less than 4.8M/UL	22	44.0	4	8.0	20.58	< 0.001 ^{HS}
From (4.8-7.2) M/UL	28	56.0	40	80.0		
Above 7.2 M/UL	0	0.0	6	12.0		
Total bilirubin count						
0.03 -1.2 mg/dl	14	28.0	4	8.0	11.77	0.003 ^{SNS}
2-5 mg/dl	36	72.0	40	80.0		
6-12 mg/dl	0	0.0	6	12.0		
Neonatal ferritin						
Less than 12mg/dl or less than 27 pmol/L	22	44.0	4	8.0	20.58	< 0.001 ^{HS}
From 12-150mg/ml or from 27-330pmol/L	28	56.0	40	80.0		
More than 150mg/ml or more than 330pmol	0	0.0	6	12.0		

Figure (1): Comparison between early and delayed cord clamping groups regarding their total bilirubin counts after 24 hrs

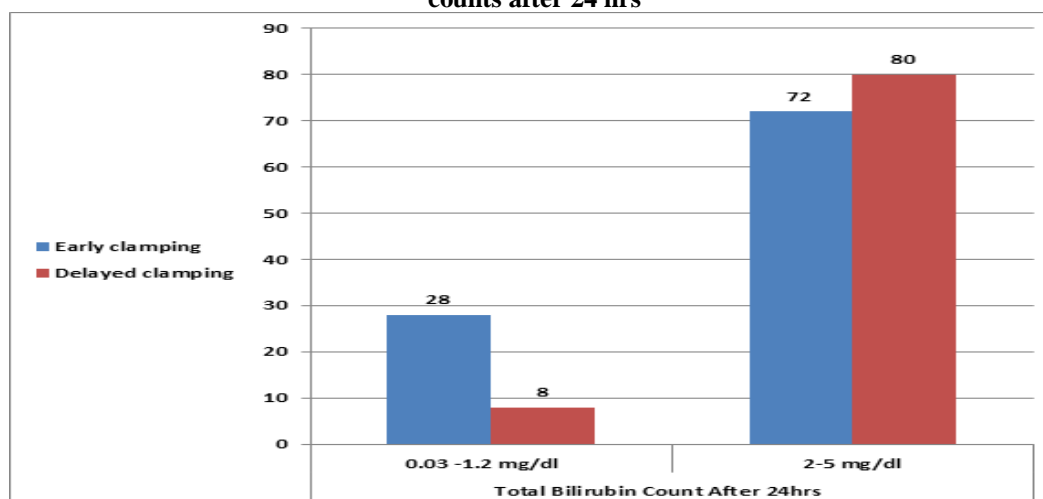
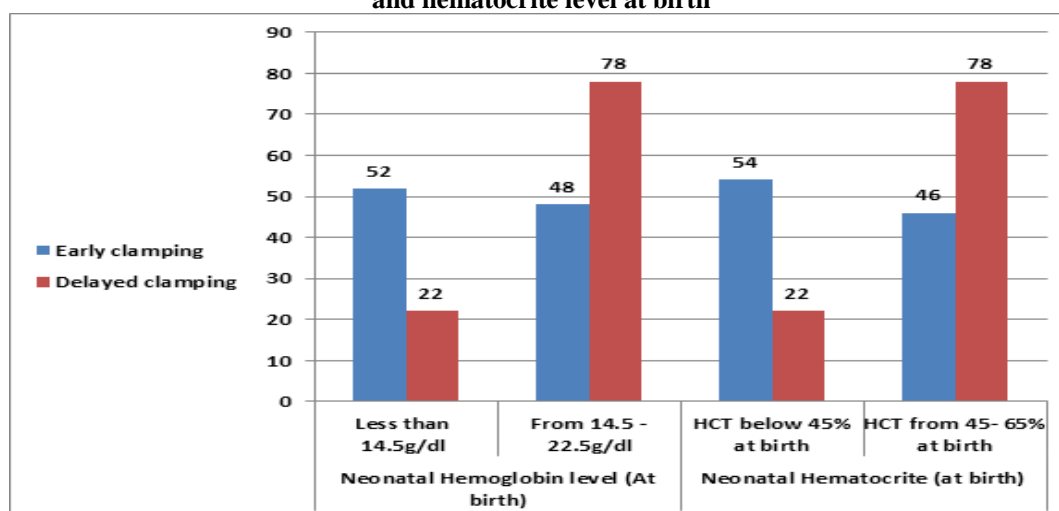


Figure (2): Comparison between early and delayed cord clamping groups regarding their hemoglobin and hematocrite level at birth

III. Discussion

Biosocial characteristics revealed in significance difference $P > 0.05$ between early and delayed cord clamping group regarding their age, education or occupation which eliminate the significance role of personal data in relation to maternal outcomes.

According to the maternal variables, study reported that nearly three fourth of women in early umbilical cord clamping group had mild postpartum blood loss (blood loss less than 500ml) and nearly half of women in delayed umbilical cord clamping group had moderate postpartum blood loss (blood loss 500ml but less than 1000ml) with statistically significant difference at P value = **0.004**. These data were in agreement with⁽¹⁵⁾ who have reported that late clamping is associated with greater postpartum bleeding. So, benefits of delayed umbilical cord clamping need to be balanced with the timely resuscitation of the woman (e.g. in cases of hemorrhage from placenta previa or placental abruption after delivery of a preterm infant). On the contrary, **Qureshi et al., (2011)**⁽¹⁶⁾ Studies results demonstrated that administration of oxytocin before or after placental expulsion does not significantly influence the major clinical outcomes such as the incidence of post partum hemorrhage (blood loss greater than 500 ml).

As regards the maternal hemoglobin and hematocrite levels at birth and after 24hrs, the findings of the present study revealed no statistically significant difference was observed between early and late umbilical cord clamping group. These findings were in agreement with⁽¹⁷⁾ who studied early and late cord clamping in three trials for 1128 women, found that maternal hemoglobin and hematocrite values at birth and after 24 hrs were similar between both groups which referred to no obvious effect of clamping time on mother's lab results.

In contrast, the newborn's hemoglobin, hematocrite, RBCs and ferritin level measured at birth and after 24 hours, the findings showed a significance difference between cord-clamping time and the slight increase observed in the hemoglobin, hematocrite, RBCs and ferritin level with statistically significant difference at birth and highly statistically significant difference after 24hrs for delayed cord clamping group. This result was in agreement with⁽¹⁸⁾ whose found that there was statistically significant difference in improved infant iron status due to improvement of laboratory results in late cord clamping group.

In addition, a remarkable increase in neonatal iron stores assessed from increased ferritin level with statistically significant difference in late cord clamping group rather than early cord clamping group. This result was in agreement with⁽¹¹⁾ whose found that ferritin levels at 2 to 3 months of age were higher in infants allocated to late clamping versus early clamping and estimated a 33% reduction in the risk of having deficient iron stores at that age.

Also, ⁽¹⁹⁾ mentioned in their studies that late cord clamping, specifically increased hemoglobin (Hb) and hematocrite (HCT) levels for the newborn with a subsequent reduction in rates of anemia and iron deficiency that may extend into the infant period. Moreover delaying umbilical cord clamping to 30–60 seconds after birth with the infant at a level below the placenta is associated with neonatal benefits, including improved transitional circulation, better establishment of red blood cell volume, and decreased need for blood transfusion. As well, it is important to note that the timing of umbilical cord clamping should not be altered for the purpose of collecting umbilical cord blood for banking.

Concerning the need for blood transfusion, the findings of the present study showed that all early and delayed umbilical cord clamping groups don't need for blood transfusion. This result was in agreement with⁽¹⁸⁾ and⁽²⁰⁾ whose reported that there were no statistically significant differences in need for blood transfusion

between the early and late cord clamping groups. This is because a substantial amount of possibly the most valuable possession: placental blood with all of its oxygen-carrying capacity, vital nutrients and immune-enhancing antibodies still provided for neonates in both early and late cord clamping

Furthermore, the current study had reported that no significant differences were observed in newborns adverse event rates and no newborns admitted to NICU as a case of hyperbilirubinemia. This result was in agreement with ¹¹⁾ whose reported that no significant difference in mean serum bilirubin levels or an increased risk of neonatal jaundice within the first 24 hours of life associated with late clamping. However, if newborns experience delayed cord clamping getting slightly in risk of becoming jaundiced, the maternity units should be able to give phototherapy, to reduce jaundice among neonates.

Furthermore, the present study showed no polycythemia related harmful effects due to increased volume of RBCs, and all polycythemic newborns were free of symptoms. The hematocrite value was from 45-65% among late group seems to be found more frequent in late than early group with statistically significant differences at p value = 0.002 and highly statistically significant at p value < 0.001 after 24 hours of birth showed by 78 % and 80% for late umbilical cord group. This result was in agreement with ⁽²¹⁾ who found a significant difference between early (<1minute) and late cord clamping group (at 1-3 minutes).

Also, these findings were in contrast with Oxford Midwives Research Group.(2011)(22), who found no polycythemic newborns were free of symptoms. However, the benefits of late cord clamping "in some instances early clamping may be required, such as when the mother is suffering from heavy blood loss immediately after childbirth, or in cases where the newborn needs immediate resuscitation, so the decision on when to cut the cord must be based on the clinical assessment of the situation", with represent best possible practice and will put mother and newborns safety first."

IV. Conclusions

Based on the current findings; the present study showed that delayed umbilical cord clamping increases neonatal hemoglobin, hematocrite, ferritin, and RBCs. Also, it doesn't increase the risk of postpartum hemorrhage and duration of third stage of labor. Delayed cord clamping doesn't cause pathological jaundice and if physiological polycythemia occurred and caused physiological jaundice, it would not need a massive treatment.

V. Recommendations

Based on the findings of this study the following recommendations are derived and suggested:-

1. Delayed cord clamping is recommended to be practiced and supported by University hospitals, ministry of health and population (MOHP) and hospital administration.
2. Increase awareness of obstetricians, midwives and pediatricians about delayed clamping practices as a one of total quality standards to achieve mothers & newborns benefits

Further Research

1. Future research should also be aimed at women's views related to this intervention.
2. Future research should also be implemented on large numbers of parturient and their neonates
3. Additional research may be helpful in refining the timing of clamping by determining the minimum time required to provide maximum benefit associated with placental transfusion.
4. The ideal time for clamping the umbilical cord after cesarean delivery versus vaginal birth is an especially important area for future research.

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