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Effect of Stripping of the Umbilical Cord Blood towards the Baby at Birth on Hematological and Developmental Outcome in Infants

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Abstract: Background- The base for common practice of cutting the umbilical cord after birth is in view of either that there is very little or no benefit by additional placental transfusion to the newborn. Active milking of the umbilical cord towards the baby prior to clamping (rather than passive) should take less than 10 seconds to perform and should resuscitation. Objectives1. Asses the selected neonatal and infant and developmental outcomes of the newborn after stripping of the umbilical cord blood at birth in interventional group.2. Asses the selected neonatal and infant and developmental outcomes of the newborn in control group3.To compare the effectiveness of selected neonatal and infant and developmental outcomes in interventional group and control group. Method- the sampling technique used was randomization. Results: Majority (56%) of the newborns were male and (44%) female in the experimental group and 60% male and 40% female in the control group. The post test Mean PCV at 6months, 9months and 12months study group was 36.84, 35.56, 35.88 and control group was 32.22, 28.90, and 26.80. - DDST-II the revised denvers developmental screening tool as per the percentile presentation ages of p25, p50, p75 and p90 reading of infants from study group for gross motor milestones showed that there are lift head up 45 degree at 2months milestones ,sit head steady at 4months , chest up arm supported at 5months , roll-over 5 months , pull to sit no head lag 6months , is in advanced stage when compared to that of control group milestones. language milestones showed that Vocalizes ,jabbers at and make sound OOO/AAH at one month at p50, p75 and p90 and laughs , Dada/mama specific by one year at p75 and p90 is in advanced stage Squeals at 4months , Dada/mama Non specific at 7months is delayed at of p25, p50, p75 and p90 readings , Imitate speech sounds is delayed at p50. Conclusion- Stripping of the umbilical cord towards the baby at birth is a safe, simple and low cost delivery procedure. Early screening using DDST-II is a valuable test for immediate and late infant developmental outcome to detect early developmental delays.

Key words: Effect, stripping of umbilical cord, hematological outcomes, infant developmental outcomes, DDST-II.

I. Introduction

An Umbilical cord blood is a baby's life blood until birth¹. The base for common practice of cutting the umbilical cord after birth is in view of either that there is very little or no benefit by additional placental transfusion² to the newborn. Active milking³ of the umbilical cord towards the baby prior to clamping (rather than passive) should take less than 10 seconds to perform and should resuscitation. It is therefore important to develop cost effective interventions to improve hematologic status⁴ of millions of children affected by this condition worldwide⁵. Bridging the "know-do" gap, it is time to reexamine stripping of umbilical cord towards the baby as a selective intervention to prevent anemia and iron deficiency in infancy.

II. Materials and Methods

Setting of the study: The study was conducted in MGM Hospital, Kalamboli and NMMC vashi. The **population** -In this study the target population consist of mothers who have undergone normal delivery and their full term neonates. **Sample** -In this study sample size (50) consisted of 25 neonates in control group, and 25 neonates in interventional group. Randomization done using computer generated randomized numbers. Inclusion criteria-Full term neonates delivered by normal vaginal delivery. Exclusion criteria -_Mothers with very high risk pregnancy⁶. (PIH, Severe Heart Disease, Gestational Diabetes Mellitus, Multiple

Pregnancy⁷, Rh-ISO Immunization, Severe Anemia), Severe birth asphyxia ,Meconium aspiration syndrome, Cord prolapsed ,Very low birth weight babies⁸, Major congenital anomalies or chromosomal anomalies in the fetus⁹.**Procedure** -Informed written consent was taken after fulfilling eligibility criteria-The screening proforma was completed for every pregnant woman screened for enrollment to the study. A structured questionnaire was used to gather obstetrical and medical details of patients. Baseline maternal data with regard to age, medicinal iron intake, parity, socioeconomic data, and detailed medical history was noted for all women. Detailed obstetric history was taken from all participants to recognize any high risk factors for PPH. The diagnosis was noted. Delivery outcome of all eligible participants was monitored. **Stripping of umbilical cord** Interventional protocol- Investigator accompanied the mothers as they were shifted to labour room for delivery.1. Informed the obstetrician the mother belongs to study group. 2. Normal preparations for full term normal vaginal delivery will be made.3. Once the baby is born he or she will be placed below the level of the placenta. The cord should remain unclamped until cord stripping is completed.4. Approximately 20 cm of cord will be stripped¹⁰ by hand from the mother towards the baby. 5. The cord will be stripped by compressing it between two fingers and pushing blood along the cord vessels towards the infant. This will be done swiftly 3 times at a rate of approximately 10cm/second¹¹.6. The procedure will not take no longer than 10 seconds to complete.7. The cord will be then be clamped¹³ and cut and normal resuscitation and care are commenced Standard care was provided if women refused to participate in the study at any time. Baseline physiological and anthropometric data with regard to birth weight, sex, gestational were recorded in all cases.

Statistical Analysis: The subject ID assigned to the enrolled women identified all the data. The data was regularly transmitted to the computer in MS excel data base and stored on email. Data will be analyzed using SPSS 19. All the data were expressed as mean, standard deviation (SD), range, Percentage using tables, graphs or charts along with Inferential and descriptive statistics. The level of significance will be set at 0.05. Comparison of control and study group p25, p50, and p75 and p90 milestone is done by Independent sample t test or unpaired t test.

Ethical clearance: The ethical permission was issued by IERC of M.G.M. University of Health Sciences.

III. Results

Table 1

Significant difference in physiological parameter of mean PCV of infants in control and study group

PCV levels		Mean	S. D.	df	t cal	t tab	p value	Significant At 5% Level (P<0.05)
Day 3	Control	39.44	6.36	48	0.57	2.01	0.567	no
	Study	40.44	5.88					
6 months	Control	32.22	5.12	48	3.81	2.01	0.000	yes
	Study	36.84	3.23					
9 months	Control	28.90	3.91	48	7.64	2.01	0.000	yes
	Study	35.56	1.91					
12 months	Control	26.80	3.31	48	12.34	2.01	0.000	yes
	Study	35.88	1.59					

Compare the effectiveness of late infant physiological outcome among study group and control group: The calculated t value for Physiological parameter PCV levels on 6 mths, 9 mths and 12 mths is 3.81, 7.64 and 12.34 respectively which is statistically significant as they are more than the table 't' value of 2.01 hence null hypothesis (H_0) is rejected and alternate hypothesis (H_1) accepted for them. There is significant improvement in PCV levels on 6, 9 and 12 mths readings among study when compared to control group subjects. The mean of study group is more than that of control group, thus proving the effectiveness of stripping of umbilical cord

Compare the effectiveness of infant gross motor developmental outcome among study group and control group: The gross motor milestone assessed of items among study group and control group at p25,p50,p75 and p90 percentile on lifts head up 45 degree and Chest up - arm supported had advanced outcome and head up 90 degree had delayed outcome at p50,p75 and bears weight on legs had delayed outcome at p25,p50,p75.

Compare the effectiveness of infant developmental outcome with language milestone among study group and control group: The language milestone assessed of items among study group and control group at p25,p50,p75 and p90 percentile were delayed in squeals and dada mama-non specific and turns to rattling sound had no significant difference.

Compare the effectiveness of infant DDST-II developmental outcome with fine motor milestone among study group and control group: the fine motor milestone assessed of items among study group and control group at p25,p50,p75 and p90 percentile were advanced in follow midline and hands together at p50,p75 and p90 and grasp rattle delayed at p25,p50.

Table: 2
Significant difference in percentiles of infant DDST-II developmental outcome for Personal and social milestone between control and interventional group

Work for toy		Mean	S. D.	SEMD	t value	P value	Outcome
P25	Control	4.18	.107	0.08	-1.75	0.106	No
	Study	4.32	.180				
P50	Control	4.28	.136	0.068	-2.37	0.012	D
	Study	4.46	.206				
P75	Control	4.54	.441	0.13	-0.84	0.409	No
	Study	4.64	.341				
P90	Control	4.68	.509	0.14	-0.85	0.402	No
	Study	4.80	.469				
feed self		Mean	S. D.	SEMD	t value	P value	Outcome
P25	Control	9.21	.157	0.19	24.44	0.000	A
	Study	4.49	.487				
P50	Control	9.32	.169	0.19	22.40	0.000	A
	Study	5.00	.675				
P75	Control	9.46	.309	0.17	23.69	0.000	A
	Study	5.29	.704				
P90	Control	9.63	.463	0.18	22.39	0.000	A
	Study	5.47	.760				
Play pat - a cake		Mean	S. D.	SEMD	t value	P value	Outcome
P25	Control	11.09	.107	0.19	17.28	0.000	A
	Study	7.86	.483				
P50	Control	11.19	.161	0.19	15.34	0.000	A
	Study	8.31	.659				
P75	Control	11.30	.211	0.20	12.99	0.000	A
	Study	8.73	.837				
P90	Control	11.35	.223	0.23	9.95	0.000	A
	Study	9.07	1.078				
Indicates want		Mean	S. D.	SEMD	t value	P value	Outcome
P25	Control	7.29	.172	0.17	-6.38	0.000	D
	Study	8.39	.418				
P50	Control	7.56	.396	0.20	-6.44	0.000	D
	Study	8.85	.606				
P75	Control	8.08	.862	0.27	-4.34	0.000	D
	Study	9.27	.837				
P90	Control	8.36	1.004	0.31	-4.11	0.000	D
	Study	9.62	1.075				

Compare the effectiveness of infant DDST-II developmental outcome with personal social milestone among study group and control group: The personal social milestone assessed of items among study group and control group at p25,p50,p75 and p90 percentile were advanced in feed self, play pat a cake ,indicates want delayed at p25,p50,p75 and p90 and work for toy delayed at p50 percentile

IV. Discussion

In a survey in India, 70% of infants between 6 and 11 months of age were found anemic¹⁰. Iron stores at birth are a major factor influencing growth and the occurrence of iron deficiency anemia (IDA) during infancy. IDA in infancy is of particular concern because of potentially detrimental effects on physical and cognitive development¹¹. The stripping of blood from the umbilical cord, or UCM, was pondered for years and suspected to be beneficial.¹² Nevertheless, methodological limitations of older studies hindered the adoption of UCM as a standard of care. A more recent series of studies assessed the safety and efficacy of UCM.¹³ clamping the cord before 2–3 minutes is likely to restrict placental transfusion. The short-term and long-term effects of this simple intervention remain unclear.¹⁴ Further evaluation of the effects of alternative policies for the timing of cord clamping at term births has been identified as a priority for future randomized trials¹⁵. Shirvani.F et al¹⁶, 2010 conducted a study to evaluate the hematological “effects of umbilical cord clamp timing on newborn’s iron status and its relation to delivery type” in term infants 48 hours after birth in Iran. Hundred mother-infant pairs were divided into two groups: early cord clamp time within 15 s (n=70) or delayed cord clamp time [15 s after delivery (n=30)]. The mean infant hemoglobin (Hgb; 16.08 gm/dL vs. 14.5 gm/dL; $P < 0.001$)

and hematocrit (Hct 47.6 vs. 42.8; $P < 0.001$) levels were significantly higher in the delayed clamping group. McDonald¹⁷, S. J. and P. Middleton, 2008 studied on “the Effect of timing of umbilical cord clamping of term infants on maternal and neonatal outcomes”. Andersson et al¹⁸. 2011 studied the “Effect of delayed versus early umbilical cord clamping on neonatal outcomes and iron status at 4 months: a randomized controlled trial”. 400 full term infants were randomized to delayed umbilical cord clamping (3 minutes after delivery) or early clamping (> 10 seconds after delivery). The result shows that there was significant difference in the level of ferritin between the groups at 4 months. This intervention has not only been proven effective, but it is cost-free, making it a particularly appropriate and sustainable intervention for low-resource areas of the world. The available cord milking studies of term infants (8 controlled trials and 1 randomized controlled trial)¹⁹⁻²⁵ conclude that cord milking significantly improves hematocrit and hemoglobin levels in the first few days of life when compared with ICC, with no associated harm.

Development is a dynamic process. Anemia in six-to-nine month olds raises the concern that birth iron stores in some infants are inadequate to sustain growth and development through the first six months of life²⁶. Ontivero et al²⁷, found differences between gender in the items “Crawls” and “Runs”, and they concluded that a high socioeconomic level and the stimulation available in the home both favor the early acquisition of motor behaviors. The items in the Personal-Social Area presented later in our study than indicated in the Denver II and in studies in Alaska, Brazil, Trinidad and Tobago, and Singapore. For example, Wijedesa²⁸ estimated delays from 10 months of age with more than a month’s difference compared to the Denver II Fine Motor-Adaptive and Personal-Social areas were the most similar to that proposed by the Denver II, although Fine Motor-Adaptive deviated towards the right in the timeline by the advances. We found delay in personal/social, fine motor, and language development skills. Oski²⁹ et al. found a significant increase in Mental Development Index scores (21.6 points) in infants aged 9 to 12 months with iron deficiency. These results indicated that iron deficiency, even in the absence of anemia, results in biochemical alterations that impair behavior in infants. Among 12 studies that Iron deficiency is associated with hypomyelination and less favorable developmental outcomes but long-term effects related to placental transfusion have not been studied. Iron supplementation in term infants is associated with improved neuro developmental outcome at 12 and 24 months of age³⁰. Fine motor milestones in our study showed that that the Follows midline at one month, looks for yarn, hands together at 4 months advanced at p50, p75 and p90, Follows 180 degree at 5 months, pass a cube, put block in a cup above 12 months delayed at p25, p50, p75, p90 readings for personal social milestones showed that that the smiles responsively and spontaneously at 2 months, play pat a cake at 10 months and feeds self advanced at 10 months at p50, p75 and p90. **Conclusions-** Child development is a dynamic process and is often hard to measure by its very nature. The findings of the study revealed that stripping of the umbilical cord towards the baby at birth is a safe and effective procedure and it improved hematocrit levels among term infants. The Denver Developmental Screening Test an easy clinically useful tool for the early identification of infants with developmental delay

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