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RESEARCH ARTICLE

EFFECT OF EARLY VERSUS IMMEDIATE BREASTFEEDING ON THE BEHAVIOR OF TERM NEWBORNS: A RANDOMIZED CONTROLLED TRIAL

***Fadous Khalife, M.C., Samarani, M., Abi Fares, G., Makhoul, G., Matta, P., Hadchity, E., Amm, M., Saaybi, J., Fneiche, A., Kerillos, J., Kosseifi, R., Matta, A. and AlOjaimi, M.**

[1]Holy Spirit University of Kaslik, UH-Notre Dame Des Secours, Byblos, Lebanon
Kobayat Hospital, Kobayat, Lebanon
[3]Anti-Tumor Therapeutic Targeting Laboratory, Faculty of Sciences, Lebanese University
[4]Balamand University, Koura, Lebanon

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ABSTRACT

Objective: Breastfeeding is the optimal nutrition of the newborn. Its nutritional, developmental and protective benefits have been widely published. Yet, the effect of immediate breastfeeding at birth on newborn behavior is barely studied. We assessed the effect of skin-to-skin breast-feeding immediately following birth versus early breastfeeding at one hour of birth on the behavior of the newborn at term.

Method: Randomized clinical trial of 82 full-term newborns born via normal vaginal delivery and no risk factors. Two groups were allocated to immediate breastfeeding with skin-to-skin contact for 1 hour in the delivery room (n = 44) or early breastfeeding (n = 38) at one hour after birth. The Neonatal Behavioral Assessment Scale (Brazelton) was used to assess the interaction of each newborn with his / her environment and cognitive development. Infants were screened around twelve to 24 hours of life.

Results: In both groups, the Brazelt on score variables were tested using the Independent T-Test. The newborns with immediate breast feeding and skin-to-skin contact scored higher than the group with early breastfeeding at 1 hour of life on the elements of habituation, motor control, state organization and state regulation of the Brazelt on score ($P<0.001$ on all items or overall).

Conclusion: Our data provides definitive evidence that immediate breastfeeding is beneficial for newborn behavior. Breast-fed infants immediately after birth with skin-to-skin contact were more alert, calm and reactive than in fants breastfed one hour after birth.

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INTRODUCTION

Breastfeeding is the optimal nutrition for the newborn. It is an act that goes beyond nutrition and integrates the baby into a communion with the mother. This intimate and complex process has many physical and psychological benefits for the mother and her baby. Breast milk is recommended exclusively for the first six months and then coupled to solid food (Schanler, 2017). Many studies have demonstrated the superiority of the breast milk compared to formula milk (Hart, Hart, 1972). Breast milk proven maternal benefits are many. It reduces the uterus size rapidly decreasing postpartum hemorrhage (Schanler, 2017). It also decreases maternal depression and neglect (Schanler, 2017). Long term benefits include reduction in the risk of breast and ovarian cancers (Schanler, 2017). Breast milk is also very beneficial for the baby: It ensures better growth (Krenz- Niedbata, 2017). Digestion (Schanler, 2017), immune defense[7] and intellectual capacities (Lancet, 2016) of the baby. Breastfeeding allows skin-to-skin contact between mom and baby creating an emotional bond between them as well as a sense of protection and security for the baby. Our study is the first to assess whether immediate breastfeeding in the delivery room would positively impact newborn's behavior as compared to delayed breastfeeding; an hour after birth. The latter is practiced in many regions throughout the world .The neonatal behavioral assessment score known as the Brazelton score was used in this study to evaluate the newborn's behavior. Our hypothesis is that immediate breastfeeding in the birth room would optimize newborn's behavior compared to

Corresponding author: **Fadous Khalife, M.C.**
Holy Spirit University of Kaslik, UH-Notre Dame Des Secours, Byblos, Lebanon

the delayed breastfeeding one hour after the return of the mother to her maternity room.

MATERIALS AND METHODS

Data collection: The study was conducted at the university hospital Notre Dame des Secours in the maternity floor. Data was collected on 82 newborns from November 2016 to March 2017. Consent of the ethics committee of the hospital was obtained along with informed consent of the patients.

Inclusion and Exclusion criteria

Inclusion criteria included healthy term infants born by normal vaginal delivery at 37 and 42 weeks of gestation with birth weights ranging from the 10th to the 90th percentile, not requiring any resuscitation at birth. The chosen mode of delivery is vaginal because it offers the possibility of allowing skin-to-skin contact immediately besides the mother's well-being and stable state of the baby. The mother's desire to breastfeed was also an important inclusion criterion. Exclusion criteria included any absolute or relative, maternal or infant contraindications for breastfeeding, any known risk factors for the newborn and any maternal postpartum complications that would limit the onset of breastfeeding. Babies born by Caesarean sections and any malformation preventing breastfeeding were also excluded.

Methodology

This study is a randomized study that assesses whether immediate breast-feeding was associated with a higher Brazelton score compared to a one-hour delayed lactation. This study is carried out by two interveners: the midwife who supervises immediate skin-to-skin breast-feeding and the pediatric resident who blindly evaluates the behavior of the newborn. Two groups of patients were taken randomly. The names of the patients numbered and divided into 2 groups randomly, the even numbers were taken in the intervention group and the odd numbers in the control group. In the first group, newborns received immediate skin-to-skin breastfeeding: At birth, the newborn is placed on the breast of the mother where thermoregulation maneuvers are applied. Baby is allowed at least one hour of skin to skin contact even after breastfeeding ceases. Theother group (control)received breast feeding at least one hour after birth.

Following the random selection and assignment of the babies to immediate or delayed breast-feeding, two major steps were implemented:

The first step was conducted by the delivery room midwife who completed a breast feeding assessment tool: "the infant breastfeeding assessment tool (IBAT)" (Table 1).The second step was conducted after the infant's arrival in the nursery by 2 pediatric residents who performed the Brazelton test blindly. This test was extensively studied and NBAS training sessions were carried out before applying it.

Tools

IBAT: the International Breastfeeding Assessment Tool: This internationally applied tool was used to assess the quality and the effectiveness of breast-feeding[9]. This tool was used in our study to ensure that all babies included in the study were well breastfed. All newborns with a low score(less than 4 out of a maximum of 12), thus poorly breastfed, were excluded from the study. This tool studies four fundamental parameters of breastfeeding, each rated from 0 to 2. The condition of the baby and the comfort of the mother are also marked from one to four but this last annotation was not included in the final score (Table 1).

Brazelton score: The Brazelton score is a behavioral assessment scale widely used in research for 20 years now (Berry Brazelton, 1995). It was used in our study since it allows the interpretation of the behavior of the newborn during the neonatal period as well as the assessment of his cognitive development. This score can be used from birth and up to 2 months of age. By the end of the assessment, the examiner has a behavioral "portrait" of the newborn that indicates his areas of strengths, adaptive reactions and possible vulnerabilities. Handling these weaknesses optimizes the bonding between parents and their baby. In our study, we focused on studying the behavior of newborns during the first 24 hours of life. It consists of 28 behavioral items each evaluated on a 9-point scale to study the behavioral repertoire of the newborn and 18 reflexes each evaluated on a 4-point scale to study the neurological status of the newborn Table 2 and 3.

Data processing

The various data retrieved and the statistical analysis of the results were processed with IBM SPSS Statistics version 22.00. The table had continuous and discrete variables and the structuring was in two-dimensional tables: one dimension related to the type of breastfeeding and the other for the different variables studied. The variables in our study are continuous and discrete variables and have been studied by the Independent-Samples T Test. The probability values of $P \leq 0.05$ were considered significant, $P<0.01$ highly significant and $P<0.001$ very highly significant. While doing the study we were faced with 2 major obstacles: The obstetricians 'consent to implement breastfeeding at 0 hours of life on their patients and the consent of the mother to do skin to skin contact for one hour at birth. This led to the small number of patients included in the study. 6 patients were excluded from the early breast feeding group at one hour of life because they had neonatal problems (2 patients had respiratory distress and 4 mothers dropped from the study because they had pain and were not ready to breastfeed at 1 hour after delivery). Our expectation was that the immediate breastfeeding group with 1 hour skin to skin contact should have a higher Brazelton Score compared with the late breastfeeding and skin to skin contact group after one hour of life.

RESULTS

In this study, we included 82 newborns, 44 of whom were in the immediate breast-feeding group and 38 in the control group (Scheme 1). Our results showed a strong correlation (Independent T-test) between immediate breast-feeding with skin-to-skin contact and a better Brazelton score (Table 5 and 6). The results are very significant for the response to the rattle (p value <0.001), the pull to sit (p value <0.001), the rate of accumulation (p value = 0.001), the irritability (p value <0.001),self-quieting (P value <0.001), consolability (p value <0.001) and hand-to-mouth coordination (p value <0.001). Due to multiple comparison, the Bonferroni correction was used still the results remained significant for rattle , pull to sit,

rate of accumulation, irritability, self-quieting, consolability and hand to mouth coordination (p value <0.003). The scores on reflexes were not statistically different.

DISCUSSION

Early childhood is a critical stage for the physical and cognitive growth of the newborn and is the basis for the child's later well-being (Zhang, 2017). Exclusive breastfeeding is one of the major pillars of this stage and many studies have demonstrated its superiority by comparing it with artificial breastfeeding. Breastfeeding has been shown to have benefits at the gastrointestinal (Schanler, 2017 and Schanler, 2017), respiratory (Tasnee Chonmaitree, 2016 and Bowatte, 2015). Immune and even cognitive (Lancet, 2016 and Schanler, 2017), levels in the infant. Similarly, there are long-term and short-term physical and emotional benefits [1] for the mother (Dewey, 1993). A major importance is alsogiven to skin-to-skin contact, which in turn has major advantages, especially on lactation. In 2016, Agudelo *et al*. have demonstrated that skin-to-skin contact has benefits in the initiation and continuation of breastfeeding. Another study done in 2010 by Branson *et al*. has also shown that a prolonged period of skin-to-skin contact leads to an increase in exclusive breastfeeding during hospitalization.

Despite the number and diversity of these studies, no studies have been conducted to test the effect of immediate breast feeding at 0 hours of life with skin-to-skin contact immediately at birth with breastfeeding for one hour on the behavior of the newborn. Hart *et al* conducted a study in 2003 by dividing the infants into two groups, one breastfed and the other fed by formula milk, and demonstrated using the Brazelton score that breastfed infants were more alert, calmer and more reactive in comparison with those fed milk formula. In our study we went further by studying newborns who were all breastfed and we showed that newborns breastfed immediately in the birth room are calmer, more alert and more reactive than those breast-fed one hour after return of the mother to her maternity room. A superiority in the vigilance of the immediately breastfed group was demonstrated by testing the response to rattle, which measures the infant's sleeping response to auditory stimulation. In addition, this group showed a major difference in the irritability by studying the types and number of stimuli that make the infant irritable. These stimuli are extracted from the daily life of the infant with his parents such as undressing, putting him in supine position etc. Infants who were immediately breastfed were less irritable and had a superiority in the ability to calm down alone as they required less consolability. These findings are consistent with those demonstrated by James Swain in 2010, which show that the separation of the baby from the mother after delivery has adverse effects on the behavior and healthy development of the newborn. A decrease in the number of crying episodes in response to various stimuli,an ability of the infant to calm down alone and support its calm state observed in the immediate breast-feeding group of our study confirms the results published in 2007 by Susan *et al*. demonstrating a decrease in crying of premature infants who underwent 3 hours of skin-to-skin contact (Manuscript, 2007). The studies by Christensson *et al*. Have also shown that the crying of newborns is due to stress of separation from their mothers (Christensson, 1995). Other skin-to-skin contact benefits have also been demonstrated by Verma and al. at 2008, such as a stronger feeling of attachment between the mother and her baby compared to the group that underwent separation (Verma, 2008). However, the peculiarity of our study resides in the correlation between skin-to-skin contact after birth and a baby's ability to mold better to the adult's body. The immediate group showed a superior ability to relax, mold and cling to the examiner while the control group showed superior resistance to the hug. Sharifa *et al*. observed that continued long-term breast-feeding was higher in the non-separated group (Sharifah Halimah Jaafar, 2011) which was explained in our study by a higher capacity of infants who had direct contact with their mother, to put their hands to the mouth and suck effectively. It would be interesting to study this factor further in future research and to follow the continuity of breastfeeding a few months after birth. Finally, our study was able to demonstrate a novelty not previously described, with a significant result. Immediately breastfed infants have better shoulder muscle tone, better muscle strength tested by the pull to sit test.

Conclusion

Our study shows that immediate breastfeeding at birth along with skin to skin contact for one hour result in a higher Brazelton score in the newborn. A larger scale multi centered study should be done to assess this relationship.

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Annexes:

Table 1. The international breastfeeding assessment tool ref

Readiness to feed	Feed effortless (3pts)	Needs mild stimulation to start feeding(2pts)	Needs vigorous stimulation (1pt)	Cannot awake(0pt)
Rooting	The baby turns effectively towards the nipple(3pts)	The baby need some help (2pts)	The baby does poorly despite the stimulus(1 pt)	The baby does not turn(0pt)
Fixing(time from the moment the baby was put on the breast until latching and feeding take place)	Latching immediately (3pts)	Taking 3-10 min(2pts)	Taking more than 10 min(1pt)	Not feeding(0 pt)
Sucking	Sucks very well on one or both breasts(3pts)	Sucks fairly well but needs help(2pts)	Sucks poorly(1pt)	Does not suck(0pt)
Baby's state	1. Sleep	2. Quite	3. Alert	4. Crying
Mother's feeling	1. Very satisfied	2. Satisfied	3. A little satisfied	4. Not satisfied

Table 2. Brazelton score ref

Habituation	9	8	7	6	5	4	3	2	1
Rattle									
Motor system	9	8	7	6	5	4	3	2	1
Pull to sit									
State Organisation	9	8	7	6	5	4	3	2	1
Rapidity of build up									
Irritability									
State Regulation	9	8	7	6	5	4	3	2	1
cuddliness									
Consolability									
Self quieting									
Hand to mouth									

Table 3. Brazelton score - reflexes

REFLEXE	0	1	2	3
Plantar				
Babinski				
rooting				
Sucking				
Glabella				
Passive resistance legs				
Passiveresistance arms				
standing				
TNR				
Moro				

Table 4. Statics results please change into a normal table and when the results are normally distributed you should give SD only and the outcomes of your statistical tests

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
Rattle	Immediate	44	8.14	.878	.132
	Early	38	6.92	1.650	.268
Pull-to-sit	Immediate	44	6.2955	1.69238	.25514
	Early	38	4.4474	1.84094	.29864
Rapidity of build up	Immediate	44	6.0455	2.42040	.36489
	Early	38	4.3684	1.71513	.27823
Irritability	Immediate	44	3.1818	1.14674	.17288
	Early	38	7.1579	1.02736	.16666
Cuddliness	Immediate	44	7.2955	.73388	.11064
	Early	38	4.2895	1.25004	.20278

……Continue

Consolability	Immediate	44	7.5455	1.26591	.19084
	Early	38	4.2895	1.43146	.23221
Self-quieting	Immediate	44	7.3636	1.08029	.16286
	Early	38	4.1053	.95265	.15454
Hand to mouth	Immediate	44	5.1818	1.71549	.25862
	Early	38	3.6579	2.05698	.33369
Plantar	Immediate	44	2.00	.000	.000
	Early	38	1.97	.162	.026
Babinski	Immediate	44	2.00	.000[a]	.000
	Early	38	2.00	.000[a]	.000
Rooting	Immediate	44	1.98	.151	.023
	Early	38	1.97	.162	.026
Sucking	Immediate	44	2.00	.000	.000
	Early	38	1.92	.273	.044
Glabella	Immediate	44	2.00	.000[a]	.000
	Early	38	2.00	.000[a]	.000
Passive resistance- legs	Immediate	44	2.00	.000	.000
	Early	38	1.92	.273	.044
Passive resistance-arms	Immediate	44	2.00	.000	.000
	Early	38	1.89	.311	.050
Palmar	Immediate	44	2.00	.000[a]	.000
	Early	38	2.00	.000[a]	.000
Standing	Immediate	44	1.9318	.25497	.03844
	Early	38	1.7895	.41315	.06702
TNR	Immediate	44	2.8182	.49522	.07466
	Early	38	2.7632	.58974	.09567
MORO	Immediate	44	2.9545	.30151	.04545
	Early	38	2.8684	.47483	.07703

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