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Evaluating the implementation of helping babies survive program to improve newborn care conditiona

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Abstract:

BACKGROUND: The main reason of newborn mortalities in low- and middle-income countries is due to the lack of skilled caregivers in providing essential care for babies. The aim of the present study was to evaluate the implementation of helping babies survive (HBS) program to improve newborn care condition in Isfahan, Iran.

MATERIALS AND METHODS: This quasi-experimental study was conducted in the labor and midwifery wards of Shahid Beheshti Hospital in Isfahan. Convenience sampling method was used for all healthy newborns who weighed >1500 g. First, the samples were selected for the control group. Then, the Helping Babies Breathe and Essential Care for Every Baby training courses were held over for ward nurses and midwives. Then, the samples of the intervention group were selected. The research tools consisted of demographic characteristic questionnaire, caregiver performance evaluation checklist, and breastfeeding registration checklist. SPSS software version 16 was used for data analysis.

RESULTS: A total of 130 newborns were divided into control ($n = 65$) and intervention groups ($n = 65$). The average time of umbilical cord clamping increased from 13.85 to 61.48 s, and the average duration of skin-to-skin contact between mother and baby increased from 11.75 to 60.47 min. The mean of early initiation of breastfeeding improved during the 1st h and the 1st day of the birth. The rate of neonatal hypothermia in the intervention group decreased sharply.

CONCLUSION: The implementation of the HBS program can positively impact newborn care condition.

Keywords:

Care, Essential Care for Every Baby, Helping Babies Breathe, helping babies survive, Iran, low- and lower-middle-income countries, newborn

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Introduction

According to the World Health Organization (WHO), 3.3 million babies die annually in the 1st month of their life, accounting for 41% of all under 5-year-old mortalities. Seventy-five percent of these mortalities occur in the 1st week and 25%–50% in the 1st day of birth.[1] Mortality statistics of Iran in 2017 showed that 60% of the mortalities of the under 1-year-old newborns had occurred in the 1st week of birth and 45% in the first 24 h of birth. Among the deaths that had occurred during the first 24 h, 52.62% had occurred in the first 2 h and 47.38% within 3–24 h after birth.[2] The most prevalent causes of newborn mortality in 2017 were reported to be preterm delivery, delivery-related complications, asphyxia, respiratory problems at birth, and infections.[3] An investigation of newborn health indicators has shown that the main cause of newborn mortality in low- and middle-income countries has been due to the lack of skilled caregivers in providing essential care for

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babies.[4] However, the basic needs of newborns can be met through spending low cost and employing effective interventions.[5] The WHO has recommended that the quality of care for mothers and newborns should be improved from pregnancy to the postpartum period through empowering midwives and nurses for newborns.[3] To meet this need, a training program called Helping Babies Survive (HBS) is recommended which includes Helping Babies Breathe (HBB), Essential Care for Every Baby (ECEB), and Essential Care for Small Babies (ECSB).[5] In 2010, the American Academy of Pediatrics (AAP) introduced a simple, low-cost program called HBB for training newborn resuscitation in areas with limited resources. The training of this program for small groups is in the form of two-person practical training and simulation through using mannequins. This program includes maintaining the newborn's body temperature, the time of umbilical cord clamping, and the bag and mask ventilation (BMV) during the first 60 s of birth called the golden minute.[6]

The results of studies have shown that training this program has helped to improve significantly skin-to-skin contact, breastfeeding in the first 60 min after birth, and delayed umbilical cord clamping after 1 min.[7,8] In addition, HBB improved resuscitation knowledge and skills,[9-12] and its implementation increased the use of newborn skin stimulation, reduced the need for bag-valve-mask ventilation, and reduced mortality.[13,14]

In addition, the ECEB program released by the AAP in 2014 focuses generally on 1st-day care and the time of discharge, as well as on the issues such as keeping the newborn warm, skin-to-skin contact immediately after birth, early breastfeeding, and care for umbilical cord, eye care, Vitamin K injections, and vaccinations.[14] Studies have shown that ECEB training can reduce the potential newborn mortality on the 1st day of life and improve neonatal healthcare.[15,16] "Golden hour" interventions have also reduced newborn complications, including hypothermia, hypoglycemia, and infection.[17]

The first HBS training course was held in Iran by international trainers in 2017. The first Iranian trainers who had been trained according to the country's protocol and had a degree from the Ministry of Health and the UNICEF were trained, and then, the implementation of the program continued. However, among the conducted studies, no study was found evaluating the implementation of the program and its effects on the situation of newborn care in Iran. On the other hand, in Iran, the processes of infant caring for newborns on the 1st day are carried out through the programs announced by the Office of Neonatal Health, and there is no program that is implemented coherently for newborns. Therefore, in this study, the HBB and ECEB programs were implemented for the first time in Isfahan, Iran, with the aim of evaluating the implementation of HBS program to improve the status of newborn care in the country. The aim of the present study was to evaluate the implementation of HBS program to improve newborn care in Isfahan, Iran.

Materials and Methods

Study design and setting

The present study was a quasi-experimental study conducted with two groups of intervention and control. Sampling was performed during a 5-month period from October 2019 to March 2020. It took 1 month for sampling of the control group, 3 months for intervention group, and 1 month for training of the caregivers. The research setting was the labor and midwifery wards of Shahid Beheshti Educational and Medical Center in Isfahan. Isfahan is a metropolis in Iran, and Shahid Beheshti Hospital is an obstetrics and gynecology hospital in Isfahan province, which has the highest number of high-risk deliveries among the provincial hospitals.

Study participants and sampling

The study samples consisted of 130 newborns who were divided into the two groups of control (n = 65) and intervention (n = 65).

The research samples were selected from healthy newborns weighing >1500 g who were born through normal vaginal delivery. In addition to the weight of the newborn and type of the delivery, other inclusion criteria consisted of no congenital anomalies and no labor complications in mother. In the case of mother's postpartum complications such as thrombophlebitis, postpartum infection, pulmonary embolism, and severe bleeding, or if the newborn was hospitalized after birth, they would be excluded from the study. The sampling method of this study was convenience method as the samples of the control group were taken convenience sampling first.

Data collection tool and technique

First, in the control group, the researcher examined the infants' status by caregivers through observation and measured and recorded the infants' information using the caregivers' performance evaluation checklist and breastfeeding registration checklist at the end of the 1st h of birth and the first 24 h. The control group has received neonatal resuscitation program including skin-to-skin contact, Vitamin K injections, breastfeeding in the 1st h of birth, and routine hospital care. After the end of sampling in the control group, a 2-day 16-h training course on HBB and ECEB program was held for 1 month for all caregivers in the maternity and rooming wards. Because the infants who are eligible for ECSB

program are usually admitted to the neonatal ward, it was not possible to do so. HBB and ECEB training course was held simultaneously by two instructors from morning to afternoon, with the instructors and the caregivers sitting around a table. Pre- and posttest were done for the caregivers on both days of the workshop. The maximum number of caregivers in each group was 8, and the instructor held the course using a neonatal training package. There was a training package for each two caregivers. A total of 26 midwives and 10 nurses were trained.

After completing the training course, the researcher began to perform the sampling of the intervention group. All newborn cares in the intervention group were performed by caregivers based on two programs, HBB and ECEB. The research tools included a demographic characteristic questionnaire for the newborns, a caregiver performance evaluation checklist, and a checklist for recording newborn breastfeeding status, which was used at the end of the 1st h and the first 24 h of birth. The maternal and newborn demographic characteristic questionnaire included weight, age, and gender of the newborn as well as the mother's age, job, education level, type of delivery, and gestational age. The caregivers' performance evaluation checklist was related to the time of umbilical cord clamping, the onset and duration of skin-to-skin contact, the time of early breastfeeding, the record of temperature, and the number of breaths of the newborn at 15–30–60 min of birth. The tool for measuring the newborn's body temperature was the FGO60 digital thermometer, and the instrument used to measure the newborn's umbilical cord clamping time was a mobile phone chronometer.

The newborn breastfeeding status checklist was used at the end of the 1st h and the first 24 h of birth. Using this checklist and observing breastfeeding, the infant's breastfeeding status was recorded. The content validity of the caregiver performance evaluation checklist was done using face validity method and the opinions of six professors and faculty members of the School of Nursing and Midwifery of Isfahan University of Medical Sciences. The newborn breastfeeding checklist is approved by the Neonatal Health Department of the Ministry of Health and Medical Education of Iran. The breastfeeding registration checklist is used by the Ministry of Health and Neonatal Health in all child-friendly hospitals and is approved by the Ministry of Interior. The newborn's breastfeeding status score was determined from 100. The infant's breastfeeding score of 0–33.33 shows a poor, a score of 33.66–66.66 shows a moderate, and score of higher than 66.67 shows a good status.

HBB data collection tool has been published by the AAP, and this questionnaire was validated in Iran by Niermeyer *et al* in 2019[18] (HBB available from: https://internationalresources.aap.org/Resource/Home). To calculate the validity of this questionnaire, the opinions of 15 experts, including 7 neonatologists and 8 faculty members of the School of Nursing and Midwifery, vice chancellor of the Minister of Health, and pediatricians were used.

In the present study, independent *t*-tests (quantitative variables) and Chi-square test (nominal qualitative variables) were used to compare the demographic characteristics between the two groups. Independent *t*-test was used to compare the means between the two groups. To compare frequencies in two groups, *t*-test was used, and SPSS 16 (version 16.0. SPSS Inc. chicago. IL. USA) was used for data analysis.

Ethical consideration

The informed consent form was completed by the infants' parents at the beginning of sampling, as well as the caregivers at the beginning of the training course. This study was conducted with the approval of the Ethics Committee of Isfahan University of Medical Sciences (IR.MUI.RESEARCH.REC.1398.411).

Results

In this study, 130 newborns in two groups of intervention and control were evaluated. One of the newborns of the intervention group was excluded from the study because of the maternal resuscitation and intubation. Finally, the study was conducted with 65 newborns in the control group and 64 newborns in the intervention group. The mean and standard deviation of the maternal age was 28.87 ± 5.54 in the intervention group and 27.83 ± 6.24 in the control group. The mean gestational age of newborns was 39 ± 1.37 weeks in the intervention group and 38 ± 1.37 weeks in the control group. Obtaining a passing score by the learners in HBB program, Multiple Choice Questions (MCQ), Objective Structured Clinical Examination (OSCE) A and B, and BMV was the criterion for entering the study.

- MCQ: 15 out of 18 questions were answered correctly
- BMV: 14 steps of BMV skills were completed
- OSCE A: Obtaining score 9 out of 12, provided the three key phases of the operational program, including drying the newborn, identifying the newborn who is not crying and putting the head in a proper position, and clearing the airway of the neonatal were implemented
- OSCE B: Obtaining score 17 out of 23, provided that stimulation of breathing by rubbing the newborn's back, having chest movement during ventilation, number of ventilations, assessing chest movement, repositioning the mask on the newborn's mouth

and nose, and repositioning the head in the proper position were performed on the neonatal.

Obtaining the passing score by learners in ECEB, MCQ, and OSCE A and B was the criterion for entering the research.

- MCQ: 21 out of 25 questions were answered correctly
- OSCE A: Obtaining score 16 out of 20, in the case of examining the newborn, measuring the newborn's temperature, weighing the newborn, providing eye care, the umbilical cord care, and Vitamin K injection
- OSCE B: Obtaining score 10 out of 13 and providing care for the neonatal.

Analysis of maternal and newborn demographic characteristics using independent *t*-test showed that the mean of maternal and gestational age, number of pregnancies, number of deliveries, number of abortions, and number of stillbirths were not statistically significant between the two groups. The results also showed that there was no significant difference between the two groups in weight, height, head circumference, sex, umbilical cord, and Apgar status of the 1st and 5th min of birth ($P > 0.05$), and the two groups were similar in this regard [Table 1].

The weight of six newborns of the control group and two of the intervention group was <2500 g, and the weight of the other newborns was >2500 g.

The results of caregivers' knowledge and skills test in HBB and ECEB programs showed a significant difference before and after training, and all caregivers were passed the final test [Table 2].

Independent *t*-test showed that the mean time of umbilical cord clamping and duration of skin-to-skin contact in the intervention group was significantly higher than the control group ($P < 0.001$) [Table 1]. With regard to hypothermia, Mann–Whitney test showed that the rate of hypothermia decreased significantly in the newborns of the intervention group compared to the control group. However, the neonatal respiratory rate did not change [Table 3].

Independent *t*-test showed that the mean of early breastfeeding in the 1st h of birth from 80.74 ± 15.44 in the control group reached to 99.72 ± 1.79 in the intervention group. Comparing the two groups of control and intervention showed that in the first 24 h of birth, the newborn breastfeeding status improved from 86.50 to 98.65 ($P \leq 0.001$) [Figure 1]. Comparison of caring level between the two groups showed that the time of umbilical cord clamping and the duration of skin-to-skin contact during the 1st h of birth increased significantly ($P < 0.001$) [Figure 2].

Discussion

According to the results, the time of umbilical cord clamping and the duration of skin-to-skin contact increased, and hypothermia was minimized in the newborns. Therefore, the implementation of the HBB and ECEB programs by caregivers improved the newborn care condition effectively.

With regard to the time of umbilical cord clamping, the results showed that the mean of this time was significantly different between the two groups. Kamath *et al*.[7] showed that the implementation of the HBB program could have a significant impact on the improvement of delayed umbilical cord clamping after 1 min. The results of the present study are in line with the results of this study. This was due to the implementation of the HBB program which had a significant effect on the delayed umbilical cord clamping in newborns. Similarly, in the study of Blouin *et al*.,[19] the implementation of a training workshop as a simple intervention increased the time of umbilical cord clamping.

There was a statistically significant difference between the two groups in terms of the relative frequency of

Table 1: Distribution of mother and neonatal by demographic characteristics

Demographic characteristics	Mean±SD		*t*	df	*P*
	Control group	Intervention group			
Mother characteristics					
Maternal age (years)	27.83±6.24	28.87±5.54	1.004	127	0.31
Number of pregnancies	2.11±1.66	2.44±1.45	1.20	127	0.23
Gestational age (weeks)	38.99±1.30	39.08±1.37	0.35	127	0.73
Newborn characteristics					
Height (cm)	51.87±2.80	53.12±2.13	1.38	127	0.15
Weight (g)	3083.85±466.37	3170.70±385.35	1.15	127	0.25
Apgar status of the 1st min of birth	9±0.18	8.95±0.21	1.36	127	0.18
Apgar status of the 5th min of birth	10±0	9.98±0.12	1	127	0.32
Time of umbilical cord clamping (s)	13.85±1.55	61.48±7.95	25.83	127	<0.001
Skin-to-skin contact (min)	9.24±0.14	60.15±0.98	8.19	127	<0.001

SD=Standard deviation

Table 2: Distribution of nurses and midwifery's knowledge and skills of helping babies breathe and essential care for every baby

Item	Mean±SD		*t*	*P*
	Pre	Post		
HBB				
Knowledge check	16.23±1.41	17.52±0.61	5.03	0.001
OSCE A	5.58±2.68	11.35±1.15	12.30	0.001
OSCE B	7.88±5.23	21.97±1.42	15.63	0.001
Bag-mask ventilation	5.52±4.98	14±0	9.22	0.001
ECEB				
Knowledge check	20.79±1.78	23.94±0.85	11.48	0.001
OSCE A	5.2±3.6	19.2±1.22	19.47	0.001
OSCE B	0.94±2.43	12.35±1.12	24.97	0.001

SD=Standard deviation, HBB=Helping Babies Breathe, ECEB=Essential Care for Every Baby, OSCE=Objective Structured Clinical Examination

Table 3: Distribution of hypothermia and neonatal respiratory rate between the two groups in different times

Time	Control group, *n* (%)	Intervention group, *n* (%)	Mann-Whitney	
			Z	*P*
Newborn temperature (min)				
15				
<36.5	40 (61.5)	0	7.53	<0.001
36.5-37.5	25 (38.8)	64 (100)		
>37.5	0	0		
30				
<36.5	17 (26.2)	0	3.68	<0.001
36.5-37.5	46 (70.7)	64 (100)		
>37.5	2 (3.1)	0		
60				
<36.5	3 (4.6)	0	3.36	<0.001
36.5-37.5	45 (69.2)	64 (100)		
>37.5	17 (26.2)	0		
Neonatal respiratory rate (min)				
15				
<40	0	0	0.99	0.32
40-60	64 (98.5)	64 (100)		
>60	1 (1.5)	0		
30				
<40	0	0	0.99	0.32
40-60	64 (98.5)	64 (100)		
>60	1 (1.5)	0		
60				
<40	0	0	0.99	0.32
40-60	64 (98.5)	64 (100)		
>60	1 (1.5)	0		

temperature in 15–30–60 min of birth. In the control group, the body temperature of 25 newborns in the 15th min of birth, 46 newborns in the 30th min, and 45 newborns in the 60th min was in the normal range of 36.5°–37.5°. In the intervention group, the body temperature of 64 newborns in the 15th min of birth, 64 newborns in the 30th min, and 64 newborns in the 60th min was in the normal range of 36.5°–37.5°. The frequency of normal temperature in the intervention group was higher than the control group, which was consistent with the findings of the studies conducted by Thukral *et al*.[20] and Dol *et al*.[5] Thukral *et al*. showed in their studies that using the ECEB training program could significantly improve the maintenance of the baby's normal temperature and prevent hypothermia. Given the relative frequency of respiration in 15–30–60 min after birth in the control and intervention groups, it was shown that the respiratory rate at these three times was not significantly different between the two groups. This result was not in line with the results of Boundy *et al*.[21] Boundy *et al*.'s results showed that skin-to-skin contact between mother and newborn in the intervention group improved the newborn's respiration, while in the present study, no difference was observed between the control and intervention groups in this regard. This difference may be due to the fact that the present study was performed on full term babies with >1500 g weight, while Boundy *et al*.'s study was performed on preterm babies. In addition, while in Boundy *et al*.'s study, skin-to-skin contact was not considered during a specific time, in the present study, skin-to-skin contact was performed immediately after birth in the intervention group. The present study, however, was consistent with the study of Tveiten *et al*.[22] Tveiten *et al*. showed in their study that the newborn's respiratory rate was in the normal range both within the cot and on the mother's chest.

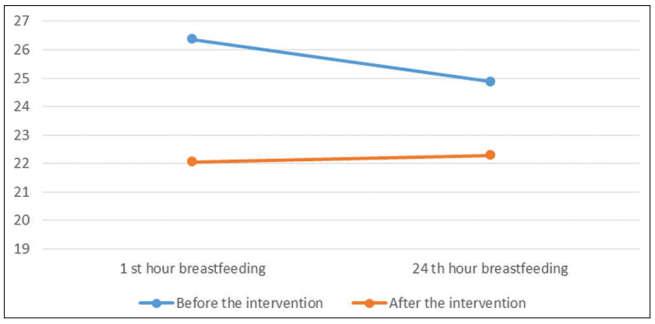

Figure 1: Early breastfeeding rate before and after the intervention

However, the mean score of newborn breastfeeding in the 1st h and the first 24 h after birth in the intervention group was significantly higher than the control group. This means that the implementation of the HBB and ECEB programs has been able to improve the newborns' breastfeeding condition. This finding was consistent with the findings of Dol *et al*.[5] and Amsalu.[23] Two studies showed that the training of the HBB–ECEB program improved neonatal outcomes including skin-to-skin contact between mother and newborn and early breastfeeding. Finally, the study of Perez *et al*.[8] showed that the implementation of HBB–ECEB programs with supportive monitoring improves the quality of neonatal care in terms of skin-to-skin contact between mother and

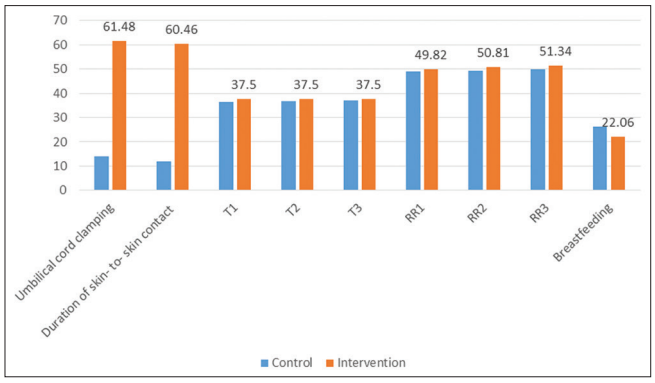

Figure 2: Comparison of neonatal care status before and after training in the control and intervention groups

newborn as well as early initiation of breastfeeding and exclusive breastfeeding.

Limitation and suggestion

The limitations of this study were impossibility of simultaneous sampling of the control group and intervention and random allocation of the samples. The authors had suggestions for HBS program based on infant mortality and stillbirth.

Furthermore, they have had the implementation of HBS program for 1 year and continuous monitoring of knowledge and skills of nurses and midwives and the use of BMV with running this program.

Conclusion

Results showed that the newborns receiving primary neonatal care under this program had a better care status and neonatal outcomes than those receiving routine care. Moreover, the implementation of this program does not require complex equipment and advanced facilities, and as an efficient, convenient, and low-cost program, it can be effective in promoting of newborn care condition. Therefore, this program can be used as a supportive care program for newborns.

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Conflicts of interest

There are no conflicts of interest.

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