RESEARCH PAPER

Impact of Delivery Room Gastric Lavage on Exclusive Breastfeeding Rates Among Neonates Born Through Meconium-Stained Amniotic Fluid: A Randomized Controlled Trial

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Background: Delivery-room gastric lavage reduces feeding intolerance and respiratory distress in neonates born through meconium-stained amniotic fluid (MSAF).

Objectives: To evaluate the effects of gastric lavage on exclusive breastfeeding and skin-to-skin contact in neonates delivered through MSAF.

Design: Randomized controlled trial.

Participants: 110 late preterm and term neonates delivered through MSAF not requiring resuscitation beyond initial steps.

Methods: Participants randomized into gastric lavage (GL) (*n*=55) and no-GL (*n*=55) groups. The primary outcome was the rate of exclusive breastfeeding at 72±12 hours of life. Secondary outcomes were time to initiate breastfeeding and establish exclusive breastfeeding, rate of exclusive breastfeeding at discharge, time to initiate skin-to-skin contact and its duration, rates of respiratory distress, feeding intolerance, and the procedure-related complications of gastric lavage monitored by pulse oximetry and videography.

Results: Both the groups were similar in baseline characteristics. 49 (89.1%) neonates in GL group could achieve exclusive breast-feeding at 72 hours compared to 48 (87.3%) in no-GL group [RR (95% CI) 1.02 (0.89-1.17); *P*=0.768]. Initiation of skin-to-skin contact was significantly delayed and the total duration was significantly less in GL group compared to no-GL group. No difference in respiratory distress and feeding intolerance was observed. Procedure-related complications included retching, vomiting, and mild desaturation.

Conclusions: Gastric lavage did not help to establish exclusive breastfeeding, delayed the initiation of skin-to-skin contact in delivery room and reduced its total duration. Moreover, the procedure of gastric lavage was associated with neonatal discomfort.

Keywords: *Feeding intolerance, Outcome, Respiratory distress, Skin-to-skin contact.*

Trial registration: Clinical Trial Registry of India: CTRI/2021/03/031727

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In utero passage of meconium complicates 9-12% of deliveries [1], exposing these neonates to the risk of developing various respiratory as well as non-respiratory complications. Over two decades back, Narchi, et al. [2], for the first time, reported the beneficial role of gastric lavage in neonates delivered through meconium-stained amniotic fluid (MSAF). Subsequently, multiple randomized controlled trials [3-6] and meta-analyses [7,8] documented similar benefits of prophylactic gastric lavage in the delivery room, particularly for the reduction in the incidence of feeding intolerance. The rationale cited by the authors for performing gastric lavage included prevention of meconium-induced gastritis, reported to be almost three times more common in this group [9], and a reduction in the risk of meconium aspiration syndrome (MAS) caused by the secondary aspiration of meconium-stained stomach contents during vomiting [6]. Based on this evidence, many neonatal units continue to perform prophylactic gastric lavage on the basis of treating unit's protocols.

However, the trials advocating gastric lavage did not assess its effect on clinically more relevant outcomes such as the rate of early establishment of exclusive breast-feeding and initiation of skin-to-skin contact [8], which may be delayed by the intervention. Initiation of breast-feeding within one hour of birth is associated with decreased

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neonatal mortality and improved childhood survival [10-12]. Similarly, immediate skin-to-skin contact has enormous benefits to the mother and the infant in the form of better temperature maintenance, promotion of early breastfeeding

initiation and exclusive breastfeeding rate, and improvement of mother-infant bonding [13]. The resuscitation guidelines endorse the practice of skin-to-skin contact and early breastfeeding at birth [14].

Although, gastric lavage is apparently an innocuous procedure, but it may be associated with several short- and long-term adverse effects such as feeding tube malposition [15], oxygen desaturation, bradycardia [16], gastrointestinal perforations [17], retching, disruption of pre-feeding behavior [18], and development of functional gastrointestinal disorders later in life [19]. These adverse effects have not been rigorously assessed in previous trials.

Standard guidelines do not discuss about the role of gastric lavage in neonates born through MSAF and there is a paucity of studies that have been conducted with meticulous monitoring of the procedure. The present study was planned to evaluate the effects of gastric lavage on the establishment of exclusive breastfeeding and skin-to-skin contact, incidence of in-hospital morbidities including respiratory distress, feeding intolerance, and procedure-related complications among late preterm and term neonates delivered through MSAF.

METHODS

This parallel-group randomized controlled trial was conducted over 17 months (March, 2021 to August, 2022) after obtaining approval from the institutional ethics committee. The trial was prospectively registered with Clinical Trial Registry of India. Written informed consent in the local language was taken from the parents before enrollment.

Settings and study population: The study was conducted in a level III tertiary care hospital with a 24-bedded neonatal intensive care unit (NICU) serving as a referral center in the state. Our unit policy adheres to baby friendly hospital initiatives (BFHI), and we have a policy of initiating and aggressively promoting exclusive breastfeeding unless justified.

The study population comprised of inborn neonates of gestational age (GA) ≥34 weeks delivered through MSAF not requiring resuscitation beyond 'initial steps' [14]. Exclusion criteria included presence of major congenital anomalies, known contraindications to breast-feeding, and failure to obtain parental consent.

The primary outcome was the rate of exclusive breastfeeding at 72±12 hours of life, defined as the proportion of neonates on breastfeeding as exclusive mode of feeding in previous 24 hours. Secondary outcomes included time to initiate breastfeeding, proportion of neonates in whom breastfeeding could be started within one hour after delivery, time to establish exclusive breastfeeding, rates of exclusive breastfeeding at discharge, time to initiate skin-to-skin contact in vaginal deliveries and its duration, rates of feeding intolerance (defined as >2 vomiting in any 4 hour period or >3 in 24 hour; or abdominal distension i.e., increase in abdominal girth of >2 cm from baseline) [3], incidence of respiratory distress, need and duration of respiratory support, other morbidities, final outcome, duration of hospital stay, and the incidence of procedure- related complications of gastric lavage monitored by pulse oximetry and videography.

Randomization, group allocation and blinding: Randomization was done by computer-based variable-block random sequence (*http://www.sealedenvelope.com*) stratified to two gestational age-based subgroups, late preterm (34-36 weeks) and term (≥37 weeks), generated by an independent statistician, not involved in the study. Eligible neonates were randomly allocated soon after delivery to either gastric lavage (GL) or no-GL group. Gastric lavage was performed by designated nursing officers attending delivery, particularly trained for this purpose prior to the commencement of the trial. Allocation concealment was ensured using sequentially numbered sealed and opaque envelopes. Though the procedure was open-label due to the nature of the intervention, outcome assessors and the statistician were blinded regarding the group allocation.

Intervention: Neonates allocated to GL group were shifted to pre-warmed radiant warmer after delivery. All necessary equipment for gastric lavage were kept ready before delivery. After thoroughly drying and covering the neonate with dry warm linen, a Masimo Rad-97 pulse oximeter probe was attached to the right wrist. An 8-Fr feeding tube was inserted orally with length equal to the distance from the bridge of the nose to the earlobe and from the earlobe to a point halfway between the xiphoid process and the umbilicus. After confirming the position of the orogastric tube by aspiration of stomach contents and pushing of air, lavage was done with 20 mL of normal saline. The whole procedure was done under strict asepsis and the entire procedure was videotaped. Neonates in no-GL group were managed as per the standard resuscitation guidelines [14].

Delayed cord clamping was done in both groups except in non-vigorous newborns, where early cord clamping was done, and the neonate was shifted to pre-warmed radiant warmer for initial steps. All neonates delivered vaginally were subjected to skin-to-skin contact accord-ing to Early Essential Newborn Care package policy of World Health Organization (WHO) [20], immediately after delivery in no-GL group, and after the procedure in those who underwent gastric lavage. The time to start as well as the duration for skin-to-skin contact were recorded by a digital stopwatch.

All infants were monitored for the development of complications, if any. Stable neonates were roomed in and

nursed with their mothers in postnatal ward. Those who developed respiratory distress or any other complication were admitted to the NICU and were managed as per our unit policy. The mothers of both the groups were counseled and helped to establish exclusive breastfeeding by lactational counselors. Enrolled neonates were monitored and followed up till discharge. Video-clips were scrutinized to note the clinical as well as pulse oximetry details, heart rate and peripheral oxygen saturation (SpO_2).

Previous studies have not assessed the outcome of exclusive breastfeeding at 72±12 hours of life. Thus, we based our sample size on the surrogate of exclusive breastfeeding at 0-6 months from the national data published in the National Family Health Survey (NFHS)-4. It showed exclusive breastfeeding rates of around 55% amongst children aged 0-6 months [21]. Assuming a similar exclu-sive breastfeeding rate in our population, to detect a diffe-rence of 25% at an alpha level of 0.05 and a power of 80%, a sample size of 52 neonates per arm was calculated (*https://sealed envelope.com/*). Considering an attrition rate of 5%, the total sample size was calculated to be 110 (55 in each group).

Statistical analysis: Data were recorded in Microsoft Excel 2019 and analyzed in SPSS version 25.0 (IBM Corp) on intention-to-treat basis. Categorical measurements are presented as number (%) while continuous variables are presented as mean (SD) or median (IQR). Fisher exact test or the Chi-square test was used to compare categorical variables while Student *t* test or Mann-Whitney *U* test were used to compare continuous variables. Relative risk (95% CI) was calculated, where relevant.

Analysis of the primary outcome was planned a priori for the sub-groups viz., late preterm vs term, vaginally born vs cesarean section delivered, and thick vs thin MSAF. Time to achieve exclusive breastfeeding was evaluated by Kaplan-Meier survival plot analysis. A *P*-value of <0.05 was considered statistically significant.

RESULTS

During the study period, 163 mothers with MSAF were assessed for eligibility, out of which 53 were excluded for various reasons. Moreover, the study had to be stopped for three months (April to June, 2021), coinciding with the second wave of COVID pandemic wherein the institute policies mandatorily separated all neonates from their mothers, compromising breastfeeding initiation and maintenance. Finally, 110 neonates were randomized into GL (*n*=55) and no-GL (*n*=55) groups. All neonates received allocated intervention and were analyzed. The flow of participants is depicted in **Fig. 1**.

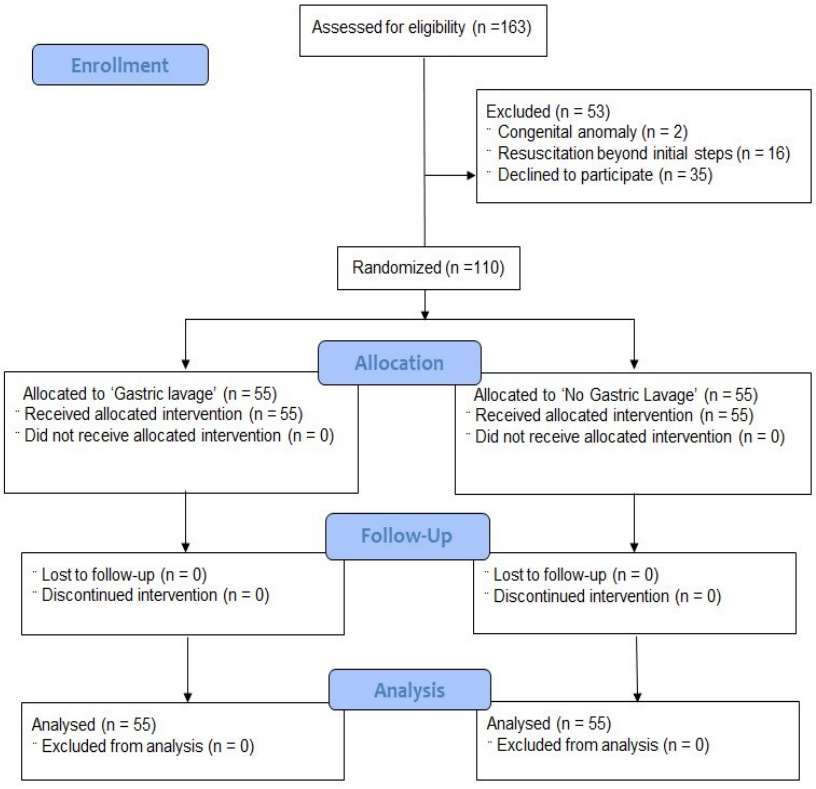


Fig. 1 Study flow diagram.

Both the groups were comparable with respect to maternal variables, intrauterine growth status, consistency of meconium, mode of delivery, birth weight (BW), GA, gender, vigorous cry at birth, and Apgar score. The mean (SD) GA of GL and no-GL groups were 38.5 (1.7) and 38.7 (2.1) weeks, respectively (*P*=0.586) **(Table I)**.

The rate of exclusive breastfeeding at 72±12 hours of life and other feeding outcomes are shown in **Table II**. A total of 49 (89.1%) neonates achieved exclusive breastfeeding at 72 hours compared to 48 (87.3%) in no-GL group [RR (95% CI) 1.02 (0.89-1.17); *P*=0.768]. There was no significant difference in the time to achieve exclusive breastfeeding between the two groups [Hazard Ratio (HR) (95% CI), 0.94 (0.63-1.40); *P*=0.771] **(Fig. 2).** The median age of first breastfeeding was 2 hours in both the groups (*P*=0.160). There were no differences in time to initiate breastfeeding, initiation of breastfeeding within first hour of birth, time to establish exclusive breastfeeding, and the rates of exclusive breastfeeding at discharge. Analyses in the pre-planned subgroups for the primary outcome did not reveal any significant difference (**Web Table I**). Overall, initiation of breastfeeding within first hour was possible in 25/27 (93%) of neonates delivered vaginally compared to 15/83 (18%) among LSCS (*P*<0.001).

In vaginally-delivered neonates, skin-to-skin contact could be initiated in 9/10 in GL and 16/17 in no-GL group **(Table III)**. One neonate in each group developed respiratory distress soon after birth and were shifted to the NICU. Initiation was significantly delayed in GL group [median (IQR) 0.3 (0.2,0.3) min in no-GL vs 16 (14,18) min in GL group; *P*<0.001]. Similarly, the total duration or dose of skin-to-skin contact was significantly longer in no-GL compared to GL group [62 (60,64) vs 50 (50,55) min; *P*<0.001)].

No differences were observed in other morbidities including the incidence of respiratory distress, duration of respiratory support, neonatal hyperbilirubinemia, hypoglycemia, polycythemia, and the duration of hospital stay. Feeding intolerance was observed in 1 (1.8%) neonate in GL group compared to 3 (5.4%) in no-GL group (*P*=0.308). There was no mortality in either group. Procedure related complications in GL group included retching (*n*=32; 58.2%), vomiting (*n*=5; 9%), and mild desaturation (SpO_2 <85%) (*n*=10; 18.2%). None of the neonates developed apnea, significant desaturation (SpO_2<80%) or brady-cardia (heart rate <100/min).

Table I Baseline Maternal and Neonatal Characteristics of Neonates Born Through Meconium Stained Amniotic Fluid Enrolled in the Study

Characteristics	*Gastric lavage (n=55)*	*No gastric lavage (n = 55)*
Maternal characteristics		
Age (y)[a]	27.1 (4.8)	26.6 (4.0)
Gravida[b]	2 (1,3)	2 (1,3)
Complete antenatal care	29 (52.7)	23 (41.8)
Oligohydraminos	6 (10.9)	9 (16.4)
PV leak >18 h	7 (12.7)	7 (12.7)
PIH	8 (14.5)	7 (12.7)
Anemia	15 (27.3)	16 (29.1)
Hypothyroidism	3 (5.5)	7 (12.7)
Fetal distress	20 (36.4)	15 (27.3)
Vaginal delivery	10 (18)	17 (31)
Thick meconium	31 (56.4)	30 (54.5)
Neonatal characteristics		
Birth weight (g)[a]	2695 (494)	2813 (476)
Gestational age (wk)[a]	38.5 (1.7)	38.7 (2.1)
Small for gestational age	21 (38)	16 (29)
Male	30 (54.5)	34 (61.8)
Vigorous baby	53 (96)	52 (95)
Apgar score [b]		
1 min	8 (8,9)	8 (8,9)
5 min	9 (9,9)	9 (9,9)
Received initial steps	2 (3.6)	3 (5.4)

Values in no. (%), [a]mean (SD) or [b]median (IQR); P>0.05 for all comparisons. PIH: pregnancy induced hypertension.

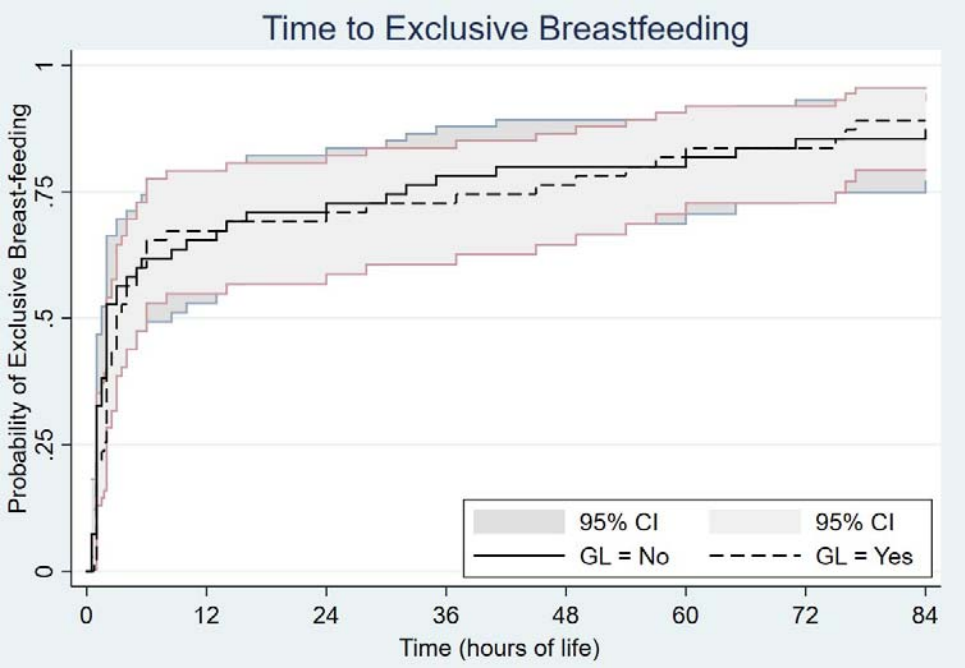
DISCUSSION

The present study sought to clarify the role of gastric lavage in late preterm and term neonates delivered through MSAF, especially with regards to breastfeeding. There was no significant difference in the rate of exclusive breastfeeding at 72 hours and at discharge, as well as the time of initiation and

Table II Breastfeeding Rates and Feeding Pattern Among Neonates With Meconium Stained Amniotic Fluid

Variables	*Gastric lavage (n=55)*	*No gastric lavage (n=55)*	*RR (95% CI)*
Exclusive breastfeeding rate at 72 (±12) h	49 (89.1)	48 (87.3)	1.02 (0.89-1.17)
Age at first breastfeeding (h)[a]	2 (1, 5)	2 (0.5, 10)	-
Initiation of breastfeeding within first hour of birth	16 (29.1)	17 (30.9)	-
Age of establishment of exclusive breastfeeding (h)[a]	3 (1.5, 27)	2 (1, 16)	-
Exclusive breastfeeding rate at discharge	52 (94.5)	53 (96.4)	0.98 (0.90-1.06)

Values in no. (%) or [a]median (IQR).



GL:gastric lavage in delivery room.

Fig. 2 Kaplan-Meier survival plot analysis for the outcome of 'time to achieve exclusive breastfeeding' in gastric lavage and no-gastric lavage groups.

establishment of exclusive breastfeeding. The time of initiation of skin-to-skin contact in delivery room was significantly delayed in GL group, and the duration of skin-to-skin contact was also significantly less. Almost half of the neonates undergoing gastric lavage had retching and 14.5% had desaturation (SpO_2 <85%) as observed during the procedure.

Exclusive breastfeeding rate at 72 hours was chosen as the primary outcome variable because we postulated that a brief single intervention as gastric lavage may impact the initiation and maintenance of exclusive breastfeeding in the initial few days of hospital stay, rather than at discharge. Nearly 90% of neonates in both the groups achieved exclusive breastfeeding at around 72 hours and almost 95% at the time of discharge. The procedure of gastric lavage did not make a significant difference in establishment of exclusive breastfeeding. A possible reason could be strict adherence to BFHI guidelines in our unit and active support for exclusive breastfeeding in both the groups. There is a paucity of studies directly com-paring the effect of gastric lavage on the rate of exclusive breastfeeding in MSAF-delivered neonates.

Table III Secondary Outcomes Among Neonates With Meconium Stained Amniotic Fluid in the Two Groups

Variables	*Gastric lavage (n=55)*	*No gastric lavage (n=55)*
Underwent skin-to-skin contact[a]	9 (16.4)	16 (29.1)
Time of initiation of skin-to-skin contact after delivery (min)[a,b,d]	16 (14, 18)	0.3 (0.2, 0.3)
Duration of skin-to-skin contact (min)[a,b]	50 (50, 55)	62 (60, 64)
Respiratory distress requiring respiratory support	5 (9.1)	8 (14.5)
Duration of respiratory support (h)[b]	6 (4, 49)	4 (2, 26)
Neonatal hyperbilirubinemia requiring phototherapy	10 (18.2)	7 (12.7)
Feeding intolerance	1 (1.8)	3 (5.4)
Hypoglycemia[c]	2 (3.6)	1 (1.8)
Polycythemia (*hematocrit* >65%)[c]	2 (3.6)	1 (1.8)
Duration of hospital stay (h)[b]	85 (57, 120)	80 (48, 97)

Values in no. (%) or [b]median (IQR). [a]One neonate in each group developed respiratory distress soon after birth and were shifted to neonatal intensive care unit; [c]asymptomatic. [d]P<0.001. No child had sepsis screen and/or culture-positive sepsis.

WHAT IS ALREADY KNOWN?

- Delivery room gastric lavage reduces feeding intolerance, and is often claimed to decrease respiratory distress in neonates born through meconium-stained amniotic fluid (MSAF).

WHAT THIS STUDY ADDS?

- Gastric lavage in late preterm and term neonates delivered through MSAF did not affect achieving exclusive breastfeeding, though it delayed the initiation of skin-to-skin contact in delivery room and reduced its total duration.

Initiation of breastfeeding within first hour of birth was possible in only 30% neonates in either group. The rates are less than that reported by NFHS-5 (41.8%) [22] and a recent hospital-based study (43.5%) from southern India [23]. The reason for low rates in our set up could be high rates of cesarean delivery, due to it being a tertiary care referral center. Late shifting of the mother from the operation theater to ward, delayed wearing-off of anesthetic effect, and uncomfortable breastfeeding position after cesarean section probably led to this delay. Several syste-matic reviews corroborate this finding, with Yisma, et al. [24] reporting a 46% lower prevalence of early initiation of breastfeeding among cesarean section delivered mother-infant dyads [25].

The process of gastric lavage caused a significant delay in the initiation and the total duration of skin-to-skin contact. Delay in skin-to-skin contact deprives the neonates from its benefits including the opportunity of early feeding at breast. However, this delay of approximately 15 minutes might not be of much clinical relevance and this delay did not translate into a significant impact towards overall exclusive breastfeeding rates at 72 hours or discharge.

The present study did not find any difference in the incidence of respiratory distress and the duration of respiratory support between the two groups, which is similar to the findings reported by several previous authors [2-4,6]. Performing gastric lavage after delivery may not help to remove meconium that has been already aspirated in the lungs. Moreover, it may be the duration of in utero hypoxia that determines the development of meconium aspiration syndrome and respiratory distress, not the amount of meconium aspirated [26]. The incidence of feeding intolerance in previous trials varied from 4.6-35% and a significant reduction in the incidence of feeding intolerance was observed after gastric lavage [2-7]. The overall incidence of feeding intolerance was low in our study, and no difference was observed between the groups. Meconium-induced gastritis leading to vomiting and feeding intolerance was not a common finding in either group of our study, and needs to be evaluated in a wider group. Though, we did not come across any serious complications of gastric lavage in our study, majority of the neonates were not comfortable during the procedure as indicated by high rate of retching and occasional vomiting and desaturation. Stringent monitoring was lacking in prior trials, except one [6], and most of them did not report any adverse events [2-6].

The major strength of our study was the meticulous observation by pulse oximetry during the procedure of gastric lavage, and strict monitoring during hospital stay. However, there is a possibility that the study was not powered enough to detect a difference of less than 25% in exclusive breastfeeding rate. This effect size for sample size calculation was chosen based on the assumption that gastric lavage would hinder the initiation of skin-to-skin contact, which in turn would lead to lower exclusive breastfeeding rates during hospital stay [27]. However, skin-to-skin contact was not practiced during cesarean deliveries in our unit, which could have attenuated the effect of gastric lavage in the overall population. Additionally, we could not study the effect of gastric lavage in non-vigorous neonates due to the small numbers (n=5). Though MSAF may be associated with delivery of more preterm neonates (around 5% deliveries below 33 weeks in high income countries [28]), our study did not include them and so the results may be considered only for neonates born at ≥34 weeks.

Gastric lavage in late preterm and term neonates delivered through MSAF did not affect the attainment of exclusive breastfeeding. Moreover, it delayed the initiation of skin-to-skin contact in delivery room and reduced its total duration. Further, it did not reduce the incidence of respiratory distress, feeding intolerance, and other in-hospital morbidities. Thus, based on this trial, the procedure of routine gastric lavage appears unwarranted in neonates born through MSAF.

Ethics clearance: Institute Ethics Committee, AIIMS, Rishikesh; No: AIIMS/IEC/21/53/12/02/2021 dated Feb 12, 2021.
Contributors: SB, RKC, SC, PS, MP, NKB, JC: conceptualized and designed the study, coordinated, and supervised data collection, drafted the initial manuscript, and reviewed and revised the manuscript; RKC: collected the data and reviewed and revised the manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.
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Note: Additional material related to this study is available with the online version at *www.indianpediatrics.net*

REFERENCES

1. Viraraghavan VR, Nangia S, Prathik BH, et al. Yield of meconium in non-vigorous neonates undergoing endotracheal suctioning and profile of all neonates born through meconium-stained amniotic fluid: A prospective observational study. Paediatr Int Child Health. 2018;38:266-70.
2. Narchi H, Kulaylat N. Is gastric lavage needed in neonates with meconium-stained amniotic fluid? Eur J Pediatr. 1999;158: 315- 7.
3. Ameta G, Upadhyay A, Gothwal S, et al. Role of gastric lavage in vigorous neonates born with meconium stained amniotic fluid. Indian J Pediatr. 2013;80:195-8.
4. Sharma P, Nangia S, Tiwari S, et al. Gastric lavage for prevention of feeding problems in neonates with meconium-stained amniotic fluid: A randomised controlled trial. Paediatr Int Child Health. 2014;34:115-9.
5. Yadav SK, Venkatnarayan K, Adhikari KM, et al. Gastric lavage in babies born through meconium stained amniotic fluid in prevention of early feed intolerance: A randomized controlled trial. J Neonatal Perinatal Med. 2018;11:39-7.
6. Gidaganti S, Faridi MM, Narang M, Batra P. Effect of gastric lavage on meconium aspiration syndrome and feed intolerance in vigorous infants born with meconium stained amniotic fluid - A randomized control trial. Indian Pediatr. 2018;55:206-10.
7. Deshmukh M, Balasubramanian H, Rao S, Patole S. Effect of gastric lavage on feeding in neonates born through meconium-stained liquor: a systematic review. Arch Dis Child Fetal Neonatal Ed. 2015;100:F394-9.
8. Singh P, Kumar M, Basu S. Gastric lavage for prevention of feeding intolerance in neonates delivered through meconium-stained amniotic fluid: A systematic review and meta-analysis. Indian Pediatr. 2021;58:973-7.
9. Narchi H, Kulaylat N. Feeding problems with the first feed in neonates with meconium-stained amniotic fluid. Paediatr Child Health. 1999;4:327-30.
10. World Health Organisation [WHO]. Indicators for Assess-ing Infant and Young Child Feeding Practices. Part 3: Country profiles. 2010. Accessed on March 20, 2021. Avail-able from: *http://www.who.int/nutrition/publications/infantfeeding/9789241599757/en/*
11. Edmond KM, Zandoh C, Quigley MA, et al. Delayed breast-feeding initiation increases risk of neonatal mortality. Pediatrics. 2006;117:e380-6.
12. Oot L, Sommerfelt A, Sethuraman K, Ross J. Estimating the effect of suboptimal breastfeeding practices on child mortality: A model in PROFILES for country-level advocacy. 2015. Accessed on Aug 2, 2021. Available from: *https://www.fantaproject.org/sites/default/files/resources/PROFILES-Breastfeeding-effect-Technical-Brief-Sept2015.pdf*
13. Moore ER, Bergman N, Anderson GC, Medley N. Early skin-to-skin contact for mothers and their healthy newborn infants. Cochrane Database Syst Rev. 2016;11:CD003519.
14. Aziz K, Lee HC, Escobedo MB, et al. Part 5: Neonatal resuscitation: 2020 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation. 2020;142:S524-50.
15. Quandt D, Schraner T, Ulrich Bucher H, Arlettaz Mieth R. Malposition of feeding tubes in neonates: Is it an issue? J Pediatr Gastroenterol Nutr. 2009;48:608-11.
16. Shiao SY, Youngblut JM, Anderson GC, DiFiore JM, Martin RJ. Nasogastric tube placement: effects on breathing and sucking in very-low-birth-weight infants. Nurs Res. 1995;44: 82-8.
17. Metheny NA, Meert KL, Clouse RE. Complications related to feeding tube placement. Curr Opin Gastroenterol. 2007;23: 178-82.
18. Widström AM, Ransjö-Arvidson AB, Christensson K, et al. Gastric suction in healthy newborn infants. Effects on circulation and developing feeding behaviour. Acta Paediatr Scand. 1987;76:566-72.
19. Anand KJ, Runeson B, Jacobson B. Gastric suction at birth associated with long-term risk for functional intestinal disorders in later life. J Pediatr. 2004;144:449-54.
20. WHO recommendations on newborn health: guidelines approved by the WHO Guidelines Review Committee. Geneva: World Health Organization; 2017 (WHO/MCA/17.07). Accessed on August 22, 2020. Available from: *http://apps.who.int/iris*
21. Government of India. Ministry of Health and Family Welfare. National Family Health Survey-4, 2015-2016. Accessed on September 17, 2020. Available from: *http://rchiips. org/nfhs/pdf/NFHS4/India.pdf*
22. Government of India. Ministry of Health and Family Welfare. National Family Health Survey-5, 2019-2021. Accessed October 13, 2022. Available from: *http://rchiips.org/nfhs/factsheet_NFHS-5.shtml#*
23. Mary JJF, Sindhuri R, Kumaran AA, Dongre AR. Early initiation of breastfeeding and factors associated with its delay among mothers at discharge from a single hospital. Clin Exp Pediatr. 2022;65:201-8.
24. Yisma E, Mol BW, Lynch JW, Smithers LG. Impact of caesarean section on breastfeeding indicators: within-country and meta-analyses of nationally representative data from 33 countries in sub-Saharan Africa. BMJ Open. 2019; 9:e027497.
25. Paksoy Erbaydar N, Erbaydar T. Relationship between caesarean section and breastfeeding: evidence from the 2013 Turkey demographic and health survey. BMC Pregnancy Childbirth. 2020;20:55.
26. Cleary GM, Wiswell TE. Meconium-stained amniotic fluid and the meconium aspiration syndrome. An update. Pediatr Clin North Am. 1998;45:511-29.
27. Moore ER, Bergman N, Anderson GC, Medley N. Early skin to skin contact for mothers and their healthy newborn infants. Cochrane Database Syst Rev. 2016;11:CD003519.
28. Tybulewicz AT, Clegg SK, Fonfé GJ, et al. Preterm meconium staining of the amniotic fluid: associated findings and risk of adverse clinical outcome. Arch Dis Child Fetal Neonatal Ed. 2004;89:F328-30.

Web Table 1: Subgroup-wise analysis of the rate of exclusive breastfeeding

Variables	Gastric lavage	No gastric lavage	p-value
Among neonates born at term (gestational age ≥37 wk) (N = 94)			
Achieved exclusive breastfeeding at 72 ±12 h, n (%)	45 (93.8) (n = 48)	41 (89.1) (n = 46)	0.422[a] (NS)
Among neonates born late preterm (*gestational age* 34-36 wk) *(N = 16)*			
Achieved exclusive breastfeeding at 72 ± 12 h, n (%)	4 (57.1) (n = 7)	7 (77.8) (n = 9)	0.377[a] (NS)
Among neonates born vaginally (n = 27)			
Achieved exclusive breastfeeding at 72 ± 12 h, n (%)	9 (90) (n = 10)	16 (94.1) (n = 17)	0.693[a] (NS)
Among neonates born by LSCS (N = 83)			
Achieved exclusive breastfeeding at 72 ± 12 h, n (%)	40 (88.9) (n = 45)	32 (84.2) (n = 38)	0.531[a] (NS)
Among neonates born through thick MSL (N = 61)			
Achieved exclusive breastfeeding at 72 ± 12 h, n (%)	28 (90.3) (n = 31)	27 (90) (n = 30)	0.966[a] (NS)
Among neonates born through thin MSL (N = 49)			
Achieved exclusive breastfeeding at 72 ± 12 h, n (%)	21 (87.5) (n = 24)	21 (84) (n = 25)	0.726[a] (NS)

IQR – Interquartile range, LSCS – Lower section Cesarean section, MSL – Meconium-stained liquor, NS – Not significant, [a]Chi-square test