

# Gastric lavage to reduce feed intolerance among vigorous neonates >34 weeks born through meconium stained liquor: A comparative study



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## ABSTRACT

**Background:** Feed intolerance during early postnatal period is common in newborns with meconium-stained liquor (MSL). Prophylactic gastric lavage in neonates delivered with MSL and its recommendation by some pediatric textbooks, despite negligible scientific evidence and evidence-based recommendations. **Aims and Objectives:** This study was designed with the objective of determining if gastric lavage in all babies with MSL led to the development of less feed intolerance as compared to those who were not subject to the procedure. **Materials and Methods:** The present study was a randomized control trial, conducted at National Medical College and Teaching Hospital, Birgunj, from December 01, 2021, to November 30, 2022. The study populations were 280 vigorous neonates with  $\geq 34$  weeks of gestation and  $\geq 1800$  g delivered with MSL. Among them, 140 neonates were kept in the lavage and non-lavage group. Data were analyzed using the Chi-square test, odds ratio, and level of significance at  $P < 0.05$ . **Results:** Thirty-two (22.85%) and 54 (38.57%) neonate in the lavage and no lavage group developed the first episode of vomiting with a significant  $P = 0.005$ . No significant difference in the incidence of feed intolerance was found (8.57% vs. 15%,  $P = 0.099$ ). None of the neonates in either group developed any complications during the procedure. **Conclusion:** Gastric lavage seems to reduce the first episode of vomiting but not overall feed intolerance in vigorous infants born through meconium-stained amniotic fluid. Hence, concluded that gastric lavage should be reserved for treating the rather rare feed intolerance than routine prophylactic in vigorous neonates delivered with MSL.

**Key words:** Neonate; Meconium stained liquor; Gastric lavage; Feed intolerance; Vomiting

## INTRODUCTION

Meconium, the first gastrointestinal excretion expelled by the neonates derived from the Greek word meconium meaning "poppy-juice,"<sup>1</sup> consist of gastrointestinal secretions, bile, bile acids, mucus, pancreatic juice, cellular debris, amniotic fluid and vernix caseosa, lanugo, and blood.<sup>2</sup> Passage of meconium follows stimulation of gut and relaxation of anal sphincter after an episode of fetal asphyxia, increased maternal age, prolonged gestation, obesity, toxemia, and anemia.<sup>3</sup> Meconium-stained amniotic fluid complicates delivery in approximately 8–25%

of live births, it is thought that the presence of meconium in the stomach can act as a chemical irritant, interfering with gastric function and causing undigested milk curds, vomiting, and feeding problems.<sup>4</sup> Feeding problems at first feed are 2.8 times more frequent in neonates born with MSAF, regardless of the consistency of amniotic fluid.<sup>5</sup> Preventive gastric lavage for meconium stained liquor (MSL) newborn and its recommendation in pediatric textbooks<sup>6,7</sup> although scientific evidence and evidence-based recommendations are insignificant, this study aims to determine whether gastric lavage in healthy infants with MSL resulted in less feed intolerance than infant who did not receive this procedure.

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## Aims and objectives

This study was designed with the objective of determining if gastric lavage in all babies with MSL led to the development of less feed intolerance as compared to those who were not subject to the procedure.

## MATERIALS AND METHODS

This study has been conducted in the Department of Pediatrics at National Medical College and Teaching Hospital Birgunj, Parsa, Nepal, from December 01, 2021, to November 30, 2022. It is a randomized control trial, prospective, and quasi-experimental study.

### Inclusion criteria

The following criteria were included in the study:

All vigorous neonates delivered through MSL

- Birth weight  $\geq 1800$  g
- Gestational age  $\geq 34$  week (by New Ballard score).

### Exclusion criteria

The following criteria were excluded from the study:

- Non-vigorous babies
- Major congenital malformations
- Neonates requiring cardiopulmonary resuscitation at birth
- Respiratory distress requiring oxygen.

### Data collection procedure

The study was approved by the Institutional Ethical Committee for Human Research of National Medical College. Total 1844 baby were delivered during December 1, 2021,–November -30, 2022, among them 442 were MSL. About 312 neonates fulfilled the inclusion criteria, where 156 even numbered neonates went under the lavage procedure group and 156 odd numbered neonates left without lavage. At last, for the study purpose 156 lavaged neonates were numbered serially and coded opaque number put in one box and similarly, 156 non-lavaged neonates were numbered serially and coded opaque number put in other box. Then for study purpose required number of neonates, that is, 140 was taken from each box by lottery method.

### Statistical analysis

#### Sampling method

Sampling technique: Random Sampling (lottery method)

$$\text{Sample Size: } n = \frac{t^2 \times p(1-p)}{m^2}$$

Where n is required sample size,  $t=1.96$  (confidence level at 95%),  $P$ =prevalence of MSL 8–25% of live birth. Hence, prevalence taken as 9%,  $m$ =margin of error at 5% (standard value of 0.05).

Thus sample size was calculated  $n=125 \pm 10\%=140$  in each group.

The data were analyzed using the Statistical Package for the Social Sciences Software Version 21 for Windows. The descriptive statistics include frequency distribution, mean, median, percentage, standard deviation, range, minimum, and maximum. In inferential Chi-square and odd ratio were examined to determine the association by multivariate logistic regression analysis. Findings are expressed in the form of tables and charts where feasible.

## RESULTS

Among total delivery conducted during study period meconium stained babies who met the inclusion criteria were included in the study. Among them, even-numbered of the neonates were assigned for the lavage procedure and odd numbered were left without procedure then by lottery method 140 neonates from each group were taken (Figure 1).

Comparison of research groups based on feed intolerance; overall, 11.8% developed feed intolerance, with 36.3% in the lavage group and 63.7% in the non-lavage group. The result is an odd ratio of 1.882 with  $P=0.099$ , which is statistically insignificant (Table 1).

Table 2 demonstrates the association of feed intolerance in the study group; in total, 36.3% were in the lavage group and 63.7% were in the non-lavage group, with  $P=0.095$ , which is statistically insignificant.

In the lavaged group, feed intolerance was seen in 44.4% of newborn males and 26.7% of newborn females ( $P=0.904$ ). Feed intolerance was acquired by 31.3% of low birth weight newborns and 41.2% of normal birth weight neonates ( $P=0.660$ ). About 33.3% of all neonates delivered vaginally and 40.0% of all neonates delivered through LSCS displayed feed resistance in the lavaged group, however, this difference was statistically insignificant with  $P=0.981$  (Table 3).

The connection between feed intolerance and gestational stage showed that 60.0% of preterm, 22.2% of term, and 40% of post-term neonates in the lavage group experienced feed intolerance ( $P=0.135$ ), which is statistically insignificant. In the lavage group, 31.3% of all infants with low birth weights and 41.2% of those with normal birth weights had feed intolerance ( $P=0.554$ ). The proportion of males who acquired feed intolerance was 44.4%, while the proportion of females who did so was 26.7% ( $P=0.290$ ). LSCS 40% and all vaginal deliveries 33.3% had acquired feed intolerance in the lavage group, with  $P=0.692$ , which is statistically insignificant (Table 4).

## DISCUSSION

This study was aimed to identify the role of gastric lavage for the prevention of first-episode vomiting and feed intolerance in neonates born with MSL.

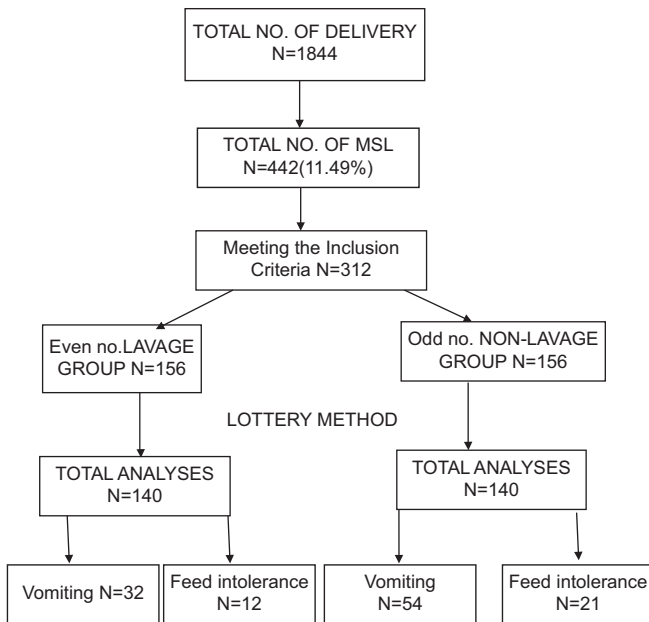


Figure 1: Study design

Regarding incidence of MSL out of total deliveries 11.49% were meconium stained which is similar to study done by Sharma et al., (2011)<sup>8</sup> where incidence was 11.97% dissimilar to study done by Kumar et al., (2017)<sup>9</sup> where incidence was 30.1%.

Regarding the distribution of study population according gender, the findings of the present study show that 56.4% of male in the lavage group and 55.0% in non-lavage group which similar to studies done by Gidaganti et al., (2018)<sup>10</sup> where the gender distribution is male 52.0% in lavage group and 55.1% in non-lavage group, similarly study done by Sharma et al., (2011)<sup>8</sup> shows the consistent findings which are 56.2% in lavage group and 54.6% in non-lavage group, and consistent with study done by Kumar et al., (2017)<sup>9</sup> in which 55.0% in lavage group and 48.0% in the non-lavage group were male, likewise study conducted by Singh et al., (2013)<sup>11</sup> also has similar findings where 54.2% in lavage group and 62.2% non-lavage group were male.

Regarding the first episode of vomiting in both groups the findings of the present study reveals; 37.2% were in the lavage group and 62.8% were in the non-lavage group with odds ratio 2.119 and P=0.005 which is statically significant similar to study done by Gidaganti et al., (2018)<sup>10</sup> where P=0.001. Similarly, the study done by Aihong (2012)<sup>12</sup>

Table 1: Comparison of feed intolerance in study groups (n=280)

Variables	Neonates		Odds ratio	CI (95%)	P-value
	Lavaged (%)	Non-lavaged (%)			
Feed intolerance					
Absent	128 (51.8)	119 (48.2)	1.882	0.887–3.992	0.099
Presence	12 (36.3)	21 (63.7)			

Table 2: Association of feed intolerance in study groups (n=280)

Variables	Neonates		χ <sup>2</sup>	P-value
	Lavaged (%)	Non-lavaged (%)		
Feed Intolerance				
Absent	128 (51.8)	119 (48.2)	2.782	0.095
Presence	12 (36.3)	21 (63.7)		

Table 3: Comparison of feed intolerance according to sex and mode of delivery (n=33)

Variables	Neonates		Odds ratio	CI (95%)	P-value
	Lavaged (%)	Non-lavaged (%)			
Sex					
Male	8 (44.4)	10 (55.6)	0.956	0.459–1.991	0.904
Female	4 (26.7)	11 (73.3)			
Birth weight					
1800–2499 g	5 (31.3)	11 (68.8)	1.179	0.566–2.458	0.660
≥2500 g	7 (41.2)	10 (58.8)			
Mode of delivery					
Vaginal	6 (33.3)	12 (66.7)	0.991	0.476–2.063	0.981
LSCS	6 (40.0)	9 (60.0)			

**Table 4: Association of feed intolerance according to period of gestation, birth weight, gender, and mode of delivery (n=33)**

Variables	Neonates		$\chi^2$	P-value
	Lavaged (%)	Non-lavaged (%)		
Period of gestation				
34–36 week	6 (60.0)	4 (40.0)	3.998	0.135
37–41 week	4 (22.2)	14 (77.8)		
>41 week	2 (40.0)	3 (60.0)		
Birth weight				
1800–2500 g	5 (31.3)	11 (68.7)	0.351	0.554
>2500	7 (41.2)	10 (58.8)		
Sex				
Male	8 (44.4)	10 (55.6)	1.117	0.290
Female	4 (26.7)	11 (73.3)		
Mode of delivery				
Vaginal	6 (33.3)	12 (66.7)	0.157	0.692
LSCS	6 (40.0)	9 (60.0)		

shows, the incidence rate of vomiting was lower with  $P=0.01$  with a statically significant P value. The present result may influence with fact that first episode of vomiting may control by preventive gastric lavage in vigorous neonates delivered from MSL. However, the study conducted by Kumar et al., (2017)<sup>9</sup> result that no significant difference in incidence of early postnatal period vomiting was found in two groups (8% vs. 11%,  $P=0.305$ ), study done by Kiremitci et al., (2011)<sup>13</sup> vomiting was observed in 6.4% of neonates in the gastric aspiration group and 10.3% of neonates in the control group ( $P=0.14$ ). The study executed by Singh et al., (2013)<sup>11</sup> a total of 19.4% infants in the intervention group and (12.2%) in the no lavage group had at least one episode of vomiting in the first 48 h of life.

In regards of the comparison and association of first episode of vomiting between two groups, the findings of the present study reveal that there is no association of first episode of vomiting with period of gestation, birth weight, mode of delivery, and gender.

Regarding feed intolerance findings of the present study reveals that 11.8% had feed intolerance among all the study population whereas, in the lavage group 8.6% and in the non-lavage group 15% having feed intolerance, which is congruent with the study done by Gidaganti et al., (2018)<sup>10</sup> which reveals feed intolerance (10.5%) among lavage group and 15.1% among the non-lavage group, a study conducted by Garg et al., (2014)<sup>14</sup> incidence of feed intolerance in Group A 9.70% and Group B 13.73%, the study conducted by Ameta et al., (2013)<sup>15</sup> found that 9.6% neonates in the lavage group developed feed intolerance compared to 13.3% neonates in the control group and the study done by Sharma et al., (2011)<sup>8</sup> feeding between the two groups (6.74% vs. 10.78%). However, study done by Narchi and Kulaylat (1999)<sup>5</sup> reported that 2.5% developed feed intolerance out of 502 of MSL which is incongruent with the present study.

Regarding the comparison and association of feed intolerance with mode of delivery, period of gestation, birth weight, and gender, the findings of the present study conclude that there is no statistically significant association which is congruent with the study done by Garg et al., (2014)<sup>14</sup> none of the baseline characteristics such as sex, birth weight, gestational age. and mode of delivery were significantly associated ( $P>0.05$ ) with occurrence of feed intolerance in our study subjects with MSL, study done by Gidaganti et al., (2018)<sup>10</sup> confirm with above observations that routine gastric lavage in MSAF babies does not seem to prevent the development of MAS, irrespective of the concentration of meconium in the amniotic fluid, mode of delivery, or birth weight. The study conducted in healthy neonates by Cuello-Garcia et al., (2005)<sup>16</sup> variables such as sex or cesarean section rate were unrelated to outcome. The study done by Kumar et al., (2017)<sup>9</sup> feed intolerance had no relationship with gender, birth weight, mode of delivery, and mode of feeding.

#### Limitations of the study

- Researcher could not be blinded for intervention due to the nature of intervention
- Results cannot be generalized on non-vigorous infants
- The neonates who developed vomiting or feed intolerance after 48 h of period not enrolled in study
- Mother may unable to differentiate between vomiting and regurgitation.

#### CONCLUSION

The present study concludes that the first episode of vomiting and feed intolerance is moderately high among the non-lavage group compared to the lavage group. No significant association with period of gestation, mode of delivery, birth weight, and gender. Gastric lavage should be reserved for treating rather rare feed intolerance than routine prophylactic in vigorous neonates delivered with MSL.

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### Authors Contribution:

**MKG**- Definition of intellectual content, literature survey, prepared first draft of manuscript, implementation of study protocol, data collection, data analysis, manuscript preparation and submission of article, concept, design, and clinical protocol; **DPDY**- Manuscript preparation, editing, and manuscript revision, design of study, statistical analysis, and interpretation; **MAA**- Review manuscript; **MS**- Literature survey and preparation of figures, coordination, and manuscript revision.

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