

Duration of Meconium Passage in Term and Preterm Infants

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ABSTRACT

Delayed first passage of meconium and also prolongation of meconium passage creates great anxiety among parents. Some study showed that that first passage of meconium is delayed in preterm infants compared to term infants. The difference in duration of meconium passage in term and preterm infant has however never been assessed before. This cross sectional study was carried between July 2010 to December 2010 among 100 Newborn babies ranging from 28 to 42 weeks of gestation who were delivered in the Department of Obstetrics and Gynaecology or admitted in the Department of Neonatology of Dhaka Medical college Hospital were included in the study. Gestational age was determined from first day of last menstruation (when available) and also by using Expanded Ballard Scoring System. In case of any discrepancy of more than 2 weeks, the later was accepted. This study was carrying out to determine the time of first passage of meconium and duration of passage of meconium in term and preterm infants. Out of total 100 infants, 58 were male and 42 were female. The numbers of babies were 21, 28, 25 and 26 in group I, II, III and IV respectively. The mean age at which the babies passed first meconium were 23.5 ± 3.5 , 33.0 ± 3.8 , 25.7 ± 4.2 and 17.3 ± 4.6 hours in group I, II, III and IV respectively, which was < 48 hours irrespective of gestational age. The mean gestational age of the babies who passed meconium for < 4 days was 37.1 ± 2.2 weeks. On the contrary, mean gestational age of the babies who passed meconium for > 4 days was 32.6 ± 4.3 weeks and this observation was statistically significant ($p < 0.001$). First passage of meconium in all newborn was within 48 hours irrespective of gestational age. Duration of passage of meconium was significantly prolonged among babies with lower gestational age.

Key words: meconium, preterm infants, term infants

Introduction

Meconium is the first intestinal discharge of the newborn infant which is black or greenish black in colour and thick, tarry and sticky in nature¹. It is composed of water and inorganic elements, enzymes, plasmaproteins, glycoproteins, lipids, haemoglobin metabolites, steroids, bile acids

and sterols. 4.99% of term infants and 76% of preterm infants pass a stool in first 24 hours of life. 99% of premature infants pass a stool by 48 hours². Passage of meconium continues 3 to 4 days usually³. Meconium is followed by transitional stool which is greenish brown stool,

non sticky in nature. Transitional stool is then replaced by regular stool within 1 to 2 days².

Immature motility of gastrointestinal tract of premature infants may play a role in delaying first passage of meconium as well as prolonging duration of passage of meconium. Earlier studies in preterm infants showed impaired gastric emptying, characterized by more frequent clustered phasic contractions but of shorter duration and lower amplitude⁴. Furthermore, monometric investigations of small intestinal motility demonstrated that duodenal clusters were less common and antroduodenal coordination was more immature in preterm infants compared to term infants⁵.

Little information is available regarding the prenatal development of colonic motility. One study using amniography showed that progression of contrast from mouth to colon took 9 hours at 32 weeks of gestational age but only half that time at term⁶. Recently, de Lorizn et al. showed that premature infants (28-32 weeks) with delayed first passage of meconium all exhibited a normal anorectal inhibitory reflex. Moreover, all other anorectal motility parameters were similar to preterm infants of same age who passed meconium within 48 hours⁷. These latter studies suggest that either mechanism of rectal propulsion is impaired, leading to failure of normal expulsion of meconium plug or that the meconium plug itself is too difficult to expel as a result of its consistency. Indeed, it is well known that meconium of preterm infants differs in composition (glycoproteins, saccharides, calcium, copper, iron and phosphorus) from that of term infants, making it thicker in consistency and more difficult to expel⁸.

Duration of meconium passage in term and preterm infants has however never been assessed in our perspective. So, this study will help to determine the time of first passage of meconium in neonate and also to compare the duration of meconium passage between term and preterm infants.

Materials and Methods

This cross sectional study was done in Department of Neonatology and Department of

Gynaecology and Obstetrics, Dhaka Medical College Hospital during the period between July 2010 and December 2010. Newborn baby born in the Department of Obstetrics and Gynaecology and admitted in Department of Neonatology of Dhaka Medical College Hospital, gestational age between 28-42 weeks were included in this study. Newborns with congenital diseases or gastrointestinal disorders requiring surgery and who died or discharged before transition of meconium to normal stool were excluded.

Detailed history of the newborn baby and mother regarding medical and obstetric problem and medications was taken, each baby was weighed in gram using NNC bar scale; and thorough physical examination was done. Gestational age was determined from first day of last menstruation (when available) and also by using Modified Ballard Scoring System. In case of any discrepancy of more than 2 weeks, the later was accepted.

Daily bowel habits were recorded from the first day of life until transition of meconium to normal stool. Stools were classified as meconium and not-meconium, based on consistency and colour. Meconium is characterized as thick, sticky and greenish-black in colour. Passage of meconium <4 days was considered as normal and >4 days was considered as prolonged³.

After enrollment, Infant was divided into four groups, based on their gestational age (GA): A) GA between 28 and 30 weeks; B) GA between 31 and 34 weeks; C) GA between 35 and 36 weeks and D) GA > 37 weeks (term born).

Results

A total of 100 newborn with gestational age between 28-42 weeks were enrolled in this study. The mean time at which babies passed first meconium was 23.5 ± 3.5 hours with range from 7 to 46 hours in group I, 33.0 ± 3.8 hours with range from 9 to 42 hours in group II, 25.7 ± 4.2 hours with range from 11 to 40 hours in group III and 17.3 ± 4.6 hours with range from 8 to 46 in group IV (table I). Table II showed duration of meconium passage was delayed more than four days in all patients in

group I and group II but 5(20.0%) in group III and 13(50.0%) in group IV, which was statistically significant ($p < 0.05$). The mean gestational age of newborn who passed meconium for < 4 days was 37.1 ± 2.2 with range from 35 to 41 weeks and mean gestational age of newborn who passed meconium for > 4 days was 32.6 ± 4.3 weeks with range from 24 to 40 weeks (table III). The mean birth weight (gm) of newborn who passed meconium for < 4 days was 2691 ± 473.9 gm with range from 2200 to 3500 gm and mean birth weight (gm) of newborn who passed meconium for > 4 days was 1637 ± 774.1 gm with range from 880 to 3500 gm (table IV). Figure 1 showed, prolongation of duration of meconium passage with lowering gestational age of newborn.

Table-I: Distribution of the study patients according to time of first passage of meconium (n=100)

Time of first passage of meconium (hours)	Group I (n=21)		Group II (n=28)		Group III (n=25)		Group IV (n=26)	
	n	%	n	%	n	%	N	%
< 12	6	28.6	8	28.6	12	48.0	12	46.2
13-24	2	9.5	12	42.9	2	8.0	8	30.8
25-36	7	33.3	3	10.7	5	20.0	4	15.4
> 37-47	6	28.6	5	17.9	6	24.0	2	7.7
Mean \pm SD	23.5	± 3.5	33.0	± 3.8	25.7	± 4.2	17.3	± 4.6
Range (min max)	(7	-46)	(9	-42)	(11	-40)	(8	-46)

Table-II: Distribution of the study patients according to duration of meconium passage (n=100).

Duration of meconium passage (in days)	Group I (n=21)		Group II (n=28)		Group III (n=25)		Group IV (n=26)		P value
	n	%	n	%	N	%	n	%	
< 4 days	0	0.0	0	0.0	20	80.0	13	50.0	0.001*
> 4 days	21	100.0	28	100.0	5	20.0	13	50.0	

Table III: Effect of Gestational age of the study patients on duration of meconium passage (n=100).

Gestational age (weeks)	Duration of meconium passage				P value
	< 4 day (n=33)		> 4 day (n=67)		
	n	%	n	%	
28-30	0	0.0	21	31.3	
31-34	0	0.0	28	41.8	
35-36	20	60.6	5	7.5	
37	13	39.4	13	19.4	
Mean \pm SD	37.1	± 2.2	32.6	± 4.3	0.001 [§]
Range(min -max)	(35	-41)	(24	-40)	

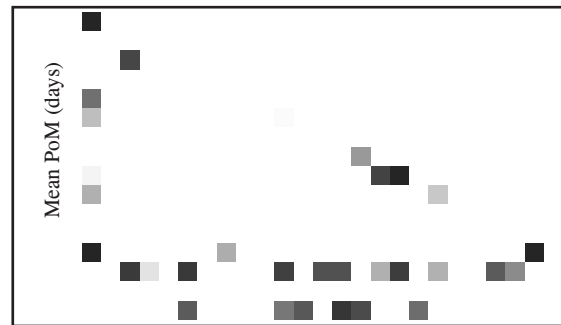


Fig-1: Correlation between gestational age in weeks and mean (SE) duration of meconium passage (PoM) in days.

Discussion

This cross sectional study was carried out with an aim to determine the time of first passage of meconium and duration of passage of meconium in term and preterm infants.

A total of 100 newborn babies who born in the Department of Obstetrics and Gynaecology or admitted in the Department of Neonatology of Dhaka Medical college Hospital during July 2010 to December 2010 were included in the study. Infants were divided into four groups, based on their gestational age (GA), Group I: GA between 28 - 30 weeks; Group II: GA between 31 - 34 weeks; Group III: GA between 35 - 36 weeks and Group IV: GA > 37 weeks (term born).

The present study findings were discussed and compared with previously published relevant studies.

First passage of meconium was within 48 hours in all newborn in this current study. According to Lorijn et al, more than 98.0% of term infants pass their first meconium stool within 48 hours⁷. Little information is available regarding the prenatal development of colonic motility. McLain using amniography, showed that progression of contrast from mouth to colon took 9 hours at 32 weeks of gestational age but only half that time at term⁶. Lorijn et al. showed that, preterm infants (PNA 28-32 weeks) with delayed first passage of meconium all exhibited a normal rectoanal inhibitory reflex⁷. Moreover,

all other anorectal motility parameters were similar to preterm infants of the same age who passed meconium within 48 hours¹⁰. Brand et al. (2005) study suggests that either mechanisms of rectal propulsion are impaired, leading to failure of normal expulsion of the meconium plug, or that the meconium plug itself is too difficult to expel as a result of its consistency. Indeed it is well known that meconium of preterm infants differs in composition (glycoprotein, saccharides, calcium, copper, iron and phosphorus) from that of term infants, making it thicker in consistency and more difficult to expel¹.

In the current study, duration of meconium passage was delayed more than four days in all patients in group I and group II, however 20.0% found in group III and 50.0% in group IV, which indicates that prematurity is associated with prolonged passage of meconium when compared to term infants. Immature motility of the gastrointestinal tract of premature infants may play a role in prolonging passage of meconium stools.

Earlier studies in preterm infants showed impaired gastric electrical activity and gastric emptying, characterized by more frequent clustered phasic contractions but of shorter duration and lower amplitude^{4,11,12}. Furthermore, manometric investigations of small intestinal motility demonstrated that duodenal clusters were less common and antroduodenal coordination was more immature in preterm infants compared to term infants⁵.

In the present study, duration of passage of meconium was associated with gestational age. It was observed that the mean gestational age of newborn who passed meconium for <4 days was 37.1±2.2 weeks and mean gestational age of newborn who passed meconium for >4 days was 32.6±4.3 weeks. The mean gestational age was significantly ($p < 0.05$) higher in newborn who passed meconium <4 days. Decreased gestational age was significantly associated with prolonged duration meconium passage. In contrast to other studies in which preterm newborn had delayed first passage of meconium⁷, this study found prolonged passage of meconium but not delayed first passage of meconium in preterm newborn.

Conclusion

- 1) The age at which the babies passed first meconium was within 48 hours irrespective of gestational age.
- 2) The passage of meconium was not delayed but prolonged in preterm infants compared to term infants.

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