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Meconium/Stool and Urinary Patterns of Healthy Newborns

Sağlıklı Yenidoğanların Mekonyum/Gaita ve İdrar Yapma Şekilleri

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Abstract

Objective: The time of passage of the newborn's first meconium/stool is an indicator of health and is used to screen for normal gastrointestinal tract function. Most newborns urinate after birth, and this is an indication of normal renal function. The aim of this study is to investigate the meconium/stool and urinary patterns of healthy neonates, and to determine whether they correlate with delivery mode, birth weight, feeding method and its frequency.

Patients and Methods: Newborns with a gestational age of ≥ 34 week delivered by normal vaginal delivery (NVD) or cesarean section (CS) were included. The newborns were fed either breast milk exclusively or a combination of breast milk and formula. The frequency of meconium/stool and urine passage and the delivery type, birth weight, and feeding method and its frequency were recorded throughout their hospital stay.

Results: A total of 1095 newborns were included. By the first 24 h after birth, 986 (90%) newborns had passed their first meconium or stool and 1084 (99%) newborns had passed their first urine. The mean number of meconium/stool and urine passages was higher in neonates delivered by CS. The mean number of meconium/stools within the first 24 h was higher in newborns fed breast milk exclusively. Combination-fed newborns and newborns with a lower birth weight had a higher mean number of urine passages. The number of meconium passages in the first 24 h was significantly lower in newborns weighing < 2500 g.

Conclusion: The mode of delivery, birth weight, and feeding method and its frequency may influence meconium/stool and urinary patterns in newborns. *(Marmara Medical Journal 2012;25:143-7)*

Key Words: Birth, Meconium, Neonatal, Urination

Özet

Amaç: Yenidoğanın ilk mekonyum/gaita çıkışı sağlıklı olmanın bir göstergesi olup normal gastrointestinal sistem fonksiyonu için bir tarama testi olarak kullanılmaktadır. Yenidoğanların çoğunun doğumdan sonra idrarını yapması normal renal fonksiyonun göstergesidir. Bu çalışmanın amacı sağlıklı yenidoğanların mekonyum/gaita ve idrar yapma şekillerini incelemek ve doğum şekli, doğum ağırlığı ve beslenme yöntemi ve sıklığı ile ilişkisini araştırmaktır.

Hastalar ve Yöntem: Çalışmaya gestasyon haftası 34 haftadan büyük normal vaginal yol ile ya da sezaryan ile doğmuş yenidoğanlar alındı. Yenidoğanlar sadece anne sütü ya da anne sütü ve formula ile beslenmekteydi. Mekonyum/gaita ve idrar yapma sıklığı ve doğum şekli, doğum tartısı ve beslenme yöntemi ve sıklığı hastanede kaldıkları süre içinde kaydedildi.

Bulgular: Toplam 1095 yenidoğan çalışmaya alındı. Doğumdan sonra ilk 24 saat içinde 986 (%90) yenidoğan ilk mekonyum/gaita yaparken, 1084 (%99) yenidoğan ilk idrarını yaptı. Mekonyum/gaita ve idrar yapma ortalama sayıları sezaryan ile doğanlarda daha yüksekti. Sadece anne sütüyle beslenen yenidoğanlarda ilk 24 saatte mekonyum/gaita ve idrar yapma ortalama sayıları daha yüksekti. Kombine beslenen yenidoğanlarda ve daha düşük doğum tartılı yenidoğanlarda ortalama idrar sayıları daha yüksekti. İkibinbeşyüz gramın altındaki yenidoğanlarda ilk 24 saatteki mekonyum sayısı önemli oranda daha düşüktü.

Sonuç: Doğum yöntemi, doğum tartısı ve beslenme yöntemi ve sıklığı yenidoğanlarda mekonyum/gaita ve idrar yapma paternini etkileyebilmektedir. *(Marmara Üniversitesi Tıp Fakültesi Dergisi 2012;25:143-7)*

Anahtar Kelimeler: Doğum, Mekonyum, Yenidoğan, İdrar

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Introduction

Routine follow-up evaluation of healthy term newborn babies is recommended for 48 h after normal vaginal delivery (NVD) and 96h after cesarean section (CS) because this may facilitate the early detection of postpartum problems. In addition to monitoring vital signs and signs of hemorrhage, infection, and hyperbilirubinemia, neonates also should be monitored for at least one spontaneous stool passage and regular urination[1].

The time of passage of the newborn's first meconium or stool is an indicator of health and is used to screen for normal gastrointestinal tract function. Failure to pass meconium may be an early sign of intestinal obstruction or anatomic abnormality. Most newborns urinate after birth, and this is an indication of normal renal function. Failure to pass meconium, stool, or urine within the first 24h after birth is an important warning sign and indicates a requirement for further investigation[2].

No information is available about the meconium and urinary patterns of Turkish neonates during their stay in the hospital nursery room. Therefore, we carried out a prospective study to determine the meconium, stool, and urinary patterns of a large newborn population relative to their birth weight, type of delivery, and feeding method and its frequency.

Patients and Methods

Newborns with a gestational age ≥ 34 wk that were delivered by NVD or CS between January 2010 and January 2011 in the American Hospital, Istanbul were included in the study. The study was approved by the local ethics committee, and written informed consent was obtained from the participating mothers.

The hospital had a discharge policy of ≥ 48 h for newborns delivered by NVD and ≥ 72 h for newborns delivered by CS. Neonates of ≥ 34 gestational weeks were routinely cared for in the newborn nursery room. Neonates who were transferred to the Neonatal Intensive Care Unit at any time were excluded from this study, and the remaining neonates who stayed in the hospital for approximately four days constituted the study population. All newborns were followed up with respect to their defecation (meconium) and urination functions in addition to other vital functions. The frequency of meconium passage and urination and the feeding method and frequency of the newborns were recorded in the nursery room.

Statistical analyses were performed using statistical software (Statistical Package for Social Sciences, version 15.0, SPSS, Inc., Chicago, IL). Descriptive statistical analyses were performed; categorical variables were determined, and numerical variables were expressed as mean ± standard deviation. The χ^2 test (chi-square test) was used to compare independent categorical variables. When the assumptions of the chi-square test were not fulfilled, the Monte Carlo simulation was used for multiple group comparisons and the Fisher exact test was used for the comparison of 2 groups. For non-normally distributed numerical variables, the Mann-Whitney test was used to compare 2 groups. The Spearman rank correlation test was used to assess correlations between non-normally distributed numerical variables, and the results were presented as correlation coefficients ρ (rho). Statistical significance was defined by $p < .05$.

Results

Of the 1095 newborns in the study, approximately half were boys and most were delivered by CS (Table I). Gestational time for most neonates was between 36 and 40 weeks, and most neonates had a birth weight from 2500 to 3500 g (Table I). Within the first 24h after birth, passage of the first meconium was noted in 986 (90%) of the newborns and passage of the first urine was noted in 1084 (99%) newborns. By 36 h after birth, 1084 (99%) newborns had passed at least 1 stool and all newborns had urinated at least once. All of the newborns had passed at least 1 stool by 48 h after birth. By 4 days after birth, all neonates and mothers in the study group had been discharged from the hospital.

The mean number of breast milk feedings was significantly greater in neonates delivered by NVD than CS ($p < 0.001$). The mean number of formula feedings was significantly less in neonates delivered by NVD than CS ($p<0.001$). The mean number of meconium or stool and urine eliminations was significantly less in neonates delivered by NVD than CS (Table II).

The mean number of meconium or stools passed within the first 24 h was significantly greater in newborns that were fed breast milk exclusively than in those fed a combination of breast milk and formula

Table I. Perinatal and Delivery History of 1095 Turkish Newborns Studied

	Number (%) patients
Sex	
Girl	542 (49)
Boy	553 (51)
Type of delivery	
Normal vaginal delivery (NVD)	367 (34)
Cesarean section (CS)	728 (66)
Gestational time (wk)	
34	17 (2)
35	87 (8)
36	241 (22)
37	54 (5)
38	240 (22)
39	278 (25)
40	157 (14)
41	18 (2)
42	2 (0.2)
Birth weight (g)	
< 2500	138 (13)
2500 to 3500	687 (63)
> 3500	270 (25)
Hospital length of stay of mother and baby after delivery (d)	
2	18 (2)
3	396 (36)
4	681 (62)
Feeding method	
Breast milk	897 (82)
Combination (breast milk and formula)	198 (18)

Table II. Relation between Delivery Type and Elimination of Meconium/Stool and Urine*

Delivery type	Normal vaginal	Cesarean section	
Time after delivery	Number of eliminations (mean±SD)	Number of eliminations (mean±SD)	P <
Meconium or stool			
0 to 12 h	0.6±0.8	0.8±0.1	.003
13 to 24 h	1±1	2±1	.001
25 to 36 h	1±1	2±1	.001
37 to 48 h	1±1	2±1	.001
47 to 60 h	1±1	2±1	.001
61 to 72 h	1±1	2±1	.001
73 to 84 h	1±1	3±1	.002
85 to 96 h	2±1	3±1	.003
Urine			
0 to 12 h	0.8±0.8	1.2±0.9	.001
13 to 24 h	2±1	2.5±0.9	.001
25 to 36 h	2±1	2.5±0.9	.001
37 to 48 h	2±1	2.5±0.8	.001
47 to 60 h	1.7±0.9	2±1	.001
61 to 72 h	2±1	3±1	.001
73 to 84 h	2±1	3±1	.001
85 to 96 h	2±1	3±1	.001

* N = 1095 patients. Data reported as number or mean±SD

Table III. Relation between Feeding Method and Elimination of Meconium /Stool and Urine*

Feeding method	Breast milk exclusively	Combination	P <
Time after delivery	Number of eliminations (mean±SD)	Number of eliminations (mean±SD)	
Meconium or stool			
0 to 12 h	0.7±0.9	0.5±0.8	.001
13 to 24 h	2±1	1±1	.001
25 to 36 h	2±1	1±1	.001
37 to 48 h	2±1	1±1	.001
47 to 60 h	3±1	2±1	.003
61 to 72 h	3±1	2±1	.003
73 to 84 h	2±1	1±1	.001
85 to 96 h	2±1	1±1	.001
Urine			
0 to 12 h	1.1±0.9	2.1±0.9	.001
13 to 24 h	2.3±0.9	3.4±0.9	.003
25 to 36 h	2.3±0.9	3±1	.001
37 to 48 h	2.2±0.9	2.5±0.9	.004
47 to 60 h	2±1	2.4±0.9	.001
61 to 72 h	2±1	3±1	.003
73 to 84 h	2±1	3±1	.003
85 to 96 h	2±1	3±1	.001

* N = 1095 patients. Data reported as mean±SD

(Table III). The mean number of urine eliminations was significantly less in newborns that were fed breast milk exclusively than in those fed a combination of breast milk and formula (Table III).

The mean number of breast milk feedings was significantly lower in low birth weight newborns (<2500 g) than higher birth weight newborns (≥2500 g). The mean number of formula feedings was significantly greater in low birth weight newborns (<2500 g) than higher birth weight newborns (≥2500 g).

The mean number of meconium or stools passed was significantly lower in low birth weight newborns (<2500 g) than higher birth weight newborns (≥2500 g) (Table IV). The mean number of urine eliminations was significantly greater in low birth weight newborns (<2500 g) than higher birth weight newborns (≥2500 g) (Table IV).

The frequency of breast milk feeding correlated significantly with the number of meconium or stool and urine eliminations during almost all time periods after birth (Table V).

Discussion

The present results confirmed important differences in feeding and urinary patterns between neonates delivered by NVD and CS. The mean number of breast milk feedings was greater, and of formula feedings lower, in neonates delivered by NVD than CS. Breast milk feeding was associated with a greater mean number of meconium or stools in the first 24 h, and a lower mean number of urine eliminations in the first 48 h, than for a combination -of breast milk and formula-feedings (Table III). The frequency of breast milk feeding correlated with the number of meconium/stool and urine eliminations (Table V).

The passing of the first meconium within the first 24 h after birth in most neonates in the present study is consistent with previously reported findings. Thus, in a previous study of Nigerian newborns (mostly full-term, delivered by NVD, and having birth weight ≥ 2500 g), the first meconium passage occurred in most newborns within 24h after birth[3]. In a previous study of Turkish newborns, most neonates passed their first meconium within the first 24 h after birth, and there was no relation between type of delivery and the timing of stool passage[4]. The previous study from Turkey used a retrospective questionnaire based on maternal recollections of the stool patterns of their newborns[4], but the present study was a prospective follow-up study. In contrast to that study in the present study, the frequencies of meconium or stool and urine elimination were higher in term newborns delivered by CS compared with those delivered by NVD.

Previous studies have reported that passage of the first stool is delayed in very low birth weight infants (<1500 g) because of the physiological immaturity of the motor mechanisms of the gut and the lack of the triggering effects of enteral food on gut hormones[5]. Meconium passage is delayed and prolonged in preterm infants, and duration of meconium passage is associated with gestational age, birth weight, and morphine therapy[6]. Although there were no preterm infants in the present study, the mean number of stools within the first 24 h were lower for term newborns with lower birth weights, and the mean number of urine eliminations from 25 to 48h were greater, than for neonates with higher birth weights (Table IV).

Table IV. Relation between Birth Weight and Elimination of Meconium/Stool and Urine*

Birth weight	< 2500 g	2500 to 3500 g	> 3500 g	P < †
Time after delivery	Number of eliminations (mean±SD)	Number of eliminations (mean±SD)	Number of eliminations (mean±SD)	
Meconium or stool				
0 to 12 h	0.3±0.6[bc]	0.6±0.8[ac]	0.8±0.9[ab]	.001
13 to 24 h	1±1[bc]	2±1[a]	2±1[a]	.007
25 to 36 h	2±1	2±1	2±1	NS
37 to 48 h	2±1[c]	2±1	2±1[a]	.02
47 to 60 h	2±1[c]	2±1	2±1[a]	.05
61 to 72 h	2±1	2±1	2±1	NS
73 to 84 h	2±1[bc]	1±1[a]	1±1[a]	.001
85 to 96 h	2±1	2±1	2±1	NS
Urine				
0 to 12 h	1±0.9	1.1±0.9	1.1±0.9	NS
13 to 24 h	2.5±0.9	2.4±0.9	2.3±0.9	NS
25 to 36 h	3±1[bc]	2.4±0.9[a]	2.3±0.9[a]	.001
37 to 48 h	2.7±0.9[bc]	2.3±0.9[a]	2±1[a]	.001
47 to 60 h	2.7±0.9[bc]	2±1[a]	2 ±1[a]	.001
61 to 72 h	2.7±0.9[bc]	2±1[a]	2±1[a]	.03
73 to 84 h	2±1[bc]	2±1[a]	2±1[a]	.001
85 to 96 h	2±1	3±1	2±2	NS

* N = 1095 patients. Data reported as number or mean±SD

† NS, not significant: P ≥ .05

[a] Significantly different from the group weighing < 2500 g

[b] Significantly different from the group weighing 2500 to 3500 g

[c] Significantly different from the group weighing > 3500 g

Table V. Correlation between Meconium/Stool and Urine versus Feeding Method in Neonates *

	Meconium /Stool		Urine	
Time after delivery	ρ*	p< †	ρ*	p< †
Breast milk exclusively				
0 to 12 h	0.325	.001	0.422	.001
13 to 24 h	0.014	NS	0.078	.04
25 to 36 h	0.104	.006	0.193	.001
37 to 48 h	0.193	.001	0.239	.001
47 to 60 h	0.398	.001	0.426	.001
61 to 72 h	0.228	.001	0.314	.001
73 to 84 h	0.418	.001	0.532	.001
85 to 96 h	0.681	.001	0.732	.001
Combination (breast milk and formula)				
0 to 12 h	0.287	.001	0.259	.001
13 to 24 h	0.127	.02	0.009	NS
25 to 36 h	0.044	NS	-0.186	.001
37 to 48 h	0.104	.04	-0.277	.001
47 to 60 h	0.048	NS	0.027	NS
61 to 72 h	0.08	NS	-0.037	NS
73 to 84 h	0.339	.001	0.475	.001
85 to 96 h	0.429	.001	0.581	.001

*The Spearman rank correlation test, ρ (rho) † NS, not significant: P≥ .05

The short- and long-term benefits of breastfeeding are well known, and breastfeeding during early infancy is encouraged in most societies[7-9]. In the present study, most newborns were exclusively fed breast milk (Table I). In the previous Nigerian study, all newborns had been fed breast milk, and there was no effect of delivery type, birth weight, or formula feeding on the time of passage of meconium and stool[3]. Other studies have also reported that the feeding method has no effect on the first meconium passage[6,10,11]. In the present study, the frequency of stool passage within 24 h was greater in newborns exclusively fed breast milk.

In a previous study of healthy newborns, 3 to 14 d after birth, mean urination frequency was 4 during a 4-h observation period[12]. Factors affecting the time to first urination after birth included gestational age, mode of delivery and form of feeding, further the time to first urination was previously noted to be earlier in newborns fed with breast milk than in those fed formula[11]. In the present study, most newborns passed their first urine within the first 24 h after birth, and after that infants delivered by NVD urinated less frequency than those delivered by CS. Urination was more frequent in combination-fed newborns compared to those who were fed breast milk exclusively. The urination frequency was higher in low birth weight newborns, possibly because low birth weight infants were fed with formula more frequently than larger birth weight infants.

The limitations of the present study include the fact that only 2 newborns were exclusively fed formula, limiting the potential for comparison between feeding with breast milk or formula alone.

Nevertheless, the present study provides useful information about meconium or stool and urinary elimination patterns of healthy newborns during their hospital stays in Turkey.

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