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ORGINAL ARTICLE

Breastfeeding Initiation Among Women With Preeclampsia With Severe Features Superimposed on Diabetes Mellitus

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Abstract

Background: Timely delivery and magnesium sulfate ($MgSO_4$) remain mainstays in the treatment of preeclampsia with severe features (PSF) which may be superimposed on preexisting conditions such as diabetes mellitus (PDM). Preeclampsia associated with premature delivery, severity of condition and mother-infant separation increase the risk of breastfeeding (BF) initiation failure.

Objective: To compare BF initiation among 158 women with late-onset PSF with 111 women with PDM all of whom received postpartum $MgSO_4$.

Methods: Retrospective cohort study of women with PSF and PDM without major fetal malformations who delivered at ≥ 34 weeks GA. PDM group was composed of 33 gestational, 55 Type 1 and 22 Type 2 diabetics. Infant feeding preference declared prenatally was either BF, formula feeding (FF) or both. At discharge, exclusive BF was by direct BF alone or BF complemented with expressed breast milk (EBM), whereas formula supplementation defined partial BF, differences were statistically significant at $p < 0.05^*$.

Results: PSF and PDM groups were similar in age, race, and late preterm delivery (73 vs. 66%), however, differed in primiparity (65 vs. 45%)*, vaginal deliveries (58 vs. 31%)*, repeat cesarean (12 vs. 30%)*, admission to the NICU (44 vs. 58%)* and neonatal hypoglycemia (20 vs. 41%)*. Both groups were similar in prior BF experience (17 vs. 22%) and in intention to BF (80 vs. 71%), intention to FF (16 vs. 18%) or intention to partially BF (4 & 11%). At the time of discharge, the rate of exclusive BF among PSF was higher (37 vs. 18%)*, the rate of FF was lower (30 vs. 46%)* while the rate of partial BF was similar (33 vs. 36%) to those in the PDM group. Thus, BF initiation (exclusive plus partial BF) occurred in 70% of PSF and in 54% of PDM*.

Conclusion: BF initiation rates for women with PDM were significantly lower than those for women with PSF alone. Although intention to BF was similar to that of the general maternal population, BF initiation rates were suboptimal for the PSF group and even lower and more concerning for the PDM group. Direct BF alone or combined with EBM, led to the exclusive provision of human milk during hospitalization to infants in both groups. Women with PSF and PDM represent groups that will require novel and targeted interventions to improve BF initiation rates.

Keywords

Preeclampsia with severe features, Diabetes Mellitus, Breastfeeding initiation

Background

Hypertensive disorders affect up to 10 percent of pregnancies and constitute one of the leading causes of maternal and perinatal mortality across the world [1-3]. Preeclampsia is a complication of pregnancy characterized by new onset hypertension and proteinuria occurring after 20 weeks gestation [3,4]. Preeclampsia affects between 2 to 8% of pregnant women in developed countries and is classified as early-onset (20 to 33 weeks gestation), late-onset (≥ 34 weeks gestation) or postpartum [5,6]. Early-onset preeclampsia, albeit less common, carries the most severe maternal and perinatal morbidity whereas the more common late-onset

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preeclampsia is also responsible for significant adverse maternal and neonatal outcomes [5-9].

According to well defined clinical and laboratory criteria, late-onset preeclampsia can be defined as preeclampsia with severe features (PSF) which may be superimposed on preexisting conditions such as diabetes mellitus (PDM) [1-3]. PSF can lead to maternal complications such as pulmonary edema, myocardial infarction, stroke, adult respiratory distress syndrome, coagulopathy, renal failure and retinal injury [4,10,11]. Adverse neonatal outcomes for women with PSF include intrauterine growth restriction, uteroplacental insufficiency and prematurity while for women with PDM, outcomes such as macrosomia, hypoglycemia and admission to the neonatal intensive care unit (NICU) are more frequent [5,10,11].

The definitive treatment for PSF and PDM remains delivery which often precipitates indicated preterm birth [3,4,10,11]. Another mainstay in the treatment of women with PSF or PDM is 24-hour postpartum administration of magnesium sulfate ($MgSO_4$) for seizure prophylaxis [1-3,7]. While serious maternal and neonatal side effects of $MgSO_4$ are rare, this therapy in addition to the condition of the mother and her often premature infant may lead to mother-infant separation during the critical first postpartum day [12-14].

Breastfeeding (BF) should be considered a desirable maternal and neonatal outcome as it is key to the short- and long-term health and wellbeing of mothers and their infants [15,16]. In addition to traditionally recognized barriers to BF among healthy women, maternal and neonatal morbidities that complicate PSF or PDM may also interfere with or delay BF initiation and/or BF duration [6-9,17,18]. While long term cardiovascular and metabolic effects of PSF and PDM on women and their infants [4,10,11] have been described, reports on BF initiation among women with PSF and PDM remain limited [6,7,17-19].

Objective

To compare BF initiation among 158 women with late-onset PSF with 111 women with PDM all of whom received postpartum $MgSO_4$.

Subjects and Methods

This retrospective cohort investigation was approved by the Institutional Review Board at The Ohio State University Wexner Medical Center. Electronic maternal and neonatal records (2013-18) were reviewed. Women with late-onset PSF or PDM were diagnosed according to established clinical and laboratory criteria [1-3,20,21]. Prepregnancy body mass index (BMI) was used to classify women as obese (BMI 29-34 kg/m^2), very obese (35-39 kg/m^2) or extremely obese (≥ 40 kg/m^2).

The study population consisted of women with PSF and PDM (a group that included gestational, Type 1 and Type 2 diabetics) and their singleton infants if delivered at ≥ 34 weeks gestation. Pregnancies affected by major malformations were excluded. Upon arrival to labor and delivery, each woman reported her past BF experience and her intended infant feeding choice. Our family-centered care system has rooming-in available and full-time lactation consultants whose services are offered to all women regardless of their infant feeding preference.

Per our hospital practice, symptomatic infants were transferred from the delivery room to the NICU for further care. Following delivery if the condition of the mother and her infant allowed, maternal-infant interactions such as holding, skin-to-skin contact, and BF were encouraged. Asymptomatic infants able to feed were transferred to the newborn nursery for routine care and glucose monitoring if indicated. Delivery room and postpartum maternal-infant interactions were observed and documented by the obstetrical, newborn nursery and NICU nursing staffs and by lactation consultants.

Screening for hypoglycemia (blood glucose < 40 mg/dl) was done via serial point of care testing (Accu-Chek®) or by plasma glucose measurement in the laboratory (Beckman Coulter AU5800, Beckman Coulter Inc., Brea, CA, U.S.A.) starting within the first two hours of life or after the first feeding and every 2-4 hours thereafter as needed. Asymptomatic infants in the newborn nursery with hypoglycemia were BF or FF and those with recurrent hypoglycemia were treated with intravenous (IV) dextrose. On admission to the NICU, most infants were started on IV dextrose and those who were able to feed were BF or FF.

Exclusive BF was defined by direct feedings from the breast, by expressed breast milk (EBM) alone or in combination with direct BF or donor human milk (DHM). Partial BF was defined by the initiation of formula supplementation. BF was considered early if it occurred within 2 hours from birth. BF initiation was defined as any BF by exclusive and partial BF combined during the last 24 hours preceding hospital discharge. Due to the retrospective study design, no follow-up information was available on infant feeding practices after hospital discharge.

Statistical Analysis

Comparisons between women with PSF and PDM were made with two-sample t-tests for continuous variables and Chi square tests for categorical variables. Significance was established at a p value < 0.05. A secondary analysis was designed to ascertain BF outcomes based on prior BF experience in each of the preeclampsia groups.

Results

The study population consisted of 158 women with PSF and 111 women with PDM, 33 with gestational diabetes mellitus (GDM), 55 with Type 1 and 23 with Type 2 pregestational diabetes mellitus (PGDM) all of whom

Table 1: Comparison of women with preeclampsia with severe features with and without diabetes.

	Severe Features (PSF)	Severe Features with Diabetes Mellitus (PDM)	*p*
Mother-Infant dyads no.	158	111	
Mothers age (y) mean ± SD	29 ± 6	30 ± 6	NS
Race			
Black no. (%)	37 (23)	30 (27)	NS
White no. (%)	99 (63)	61 (55)	NS
Hispanic no. (%)	12 (8)	12 (11)	NS
Other no. (%)	10 (6)	8 (7)	NS
Chronic hypertension no. (%)	0 (0)	43 (39)	0.0001
BMI kg/m^2 mean ± SD	30 ± 8	37 ± 9	0.0001
BMI kg/m^2 ≥ 35 no. (%)	39 (25)	55 (50)	0.0001
Primiparous no. (%)	103 (65)	50 (45)	0.001
Mode of Delivery			
Vaginal no. (%)	91 (58)	34 (31)	0.0001
Primary cesarean no. (%)	48 (30)	43 (39)	NS
Repeat cesarean no. (%)	19 (12)	34 (30)	0.0003
Mother length of stay (d) mean ± SD	5 ± 1	5 ± 2	NS

received postpartum $MgSO_4$ for seizure prophylaxis. Women with gestational diabetes were younger (29y) than those with Type 1 (34y) and Type 2 (39y) diabetes (*p* 0.001). Race distribution was similar between the sub-groups except that white women were more common among Type 1 patients. BMI ≥ 35 was observed among 42% of gestational, 47% of Type 1 and 51% of Type 2 women ($p < 0.001$). Chronic hypertension (CHTN) affected 48% of gestational, 27% of Type 1 and 57% of Type 2 diabetics (*p* 0.03). Mode of delivery was similar across the groups, where one third were vaginal and two thirds cesarean delivery. Mean gestational age at delivery (36 ± 1 week) and the rate of late premature delivery (61 vs. 76%) were similar. Significantly, mean birth weight was lower among gestational (2710g) than among Type 1 (3334g) and Type 2 (3176g) diabetics ($p < 0.0001$). Admission to the NICU was required for 58% of infants of gestational, 64% of Type 1 and 48% of Type 2 diabetics. All mothers and infants from the PSF and PDM groups were discharged in good health.

Comparison of women with preeclampsia with severe features with and without diabetes

Clinical and demographic characteristics of women with PSF and those with PDM are shown in Table 1. Most variables were similar although primiparity and rate of vaginal delivery were greater in the PSF group. BMI and rate of repeat cesarean delivery were higher in the PDM group. Indications for primary cesarean (failed induction of labor 20%, non-reassuring fetal wellbeing 30%, worsening hypertension 23%, malpresentations 16% and miscellaneous 11%) were similar among the groups. Consistent with the diagnosis and treatment of PSF and PDM, all women received 24-hour postpartum $MgSO_4$. Additional antihypertensive medications were given to 26% of women in the PSF and in 66% of women in the PDM group ($p < 0.01$). CHTN was present in 43 (39%) of women in the PDM group but none of the women in the PSF group ($p < 0.01$).

Neonatal outcomes of infants born to women with preeclampsia with severe features with and without diabetes

Neonatal outcomes of infants born to women with PSF and PDM are shown in Table 2. The PSF and PDM groups were similar in gestational age (36 ± 1 week), rate of late prematurity (73 vs. 66%), length of hospital stay (6 vs. 6d) and being discharged home concurrently with their mothers (70 vs. 69%). Large for gestation infants were more common in the PDM group (34 vs. 11%) while small for gestation infants were more common in the PSF group (22 vs. 10%) ($p < 0.001$). Neonatal hypoglycemia (41 vs. 20%) and admission to the NICU (58 vs. 44%) were more common in the PDM group ($p < 0.001$ and 0.04, respectively).

Of the infants admitted to the NICU, 89% of the PSF and 81% of the PDM were late preterm. Comparison of NICU admission diagnoses between PSF and PDM groups showed a similar incidence of respiratory distress (33 vs. 24%), apnea-bradycardia-cyanosis (11 vs. 10%), temperature instability-hypotonia-poor feeding (26 vs. 14%) and miscellaneous (7 vs. 8%). Hypoglycemia was the most common diagnosis (44 vs. 23%) among infants of the PDM group.

Prior BF experience and early BF among women with preeclampsia with severe features with and without diabetes

All women remained in labor and delivery for the

first 24-hours postpartum for $MgSO_4$ administration. Skin-to-skin contact and the rate of early BF during the first 2 postpartum hours were similar among the PSF and PDM groups (Table 3).

Further analysis of the influence of mode of delivery on the PSF group showed that 29 of 91 (32%) women who delivered vaginally and 11 of 67 (16%) who delivered by section BF their infants during the first two postpartum hours ($p < 0.02$). Among women in the PDM group, 13 of 34 (38%) who delivered vaginally and 7 of 77 (9%) who delivered by section BF their infants during the first two postpartum hours ($p < 0.001$). However, within 6 hours from birth, the influence of mode of delivery on the time to first BF for either group was similar.

There were fewer multiparous women in the PSF than in the PDM group, although prior BF experience was more common in the PSF group (69%) compared to the PDM group (48%, p 0.02). Breastfeeding initiation among women with prior BF experience was 68% in the PSF and 69% in the PDM group. Among multiparous women with no prior BF experience, any BF was recorded for 12% in the PSF and 30% in the PDM group.

Intention to BF and BF at discharge for women with preeclampsia with severe features with and without diabetes

Intention to BF (80 vs. 71%), intention to FF (16 vs. 18%) and intention to BF and FF (4 vs. 11%) were similar between the PSF and PDM groups (Table 4). At the time of discharge the rate of exclusive BF among PSF was higher (37 vs. 18%, p 0.001), the rate of FF was lower

Table 2: Neonatal outcomes of infants born to women with preeclampsia with severe features with and without diabetes.

	Severe Features (PSF)	Severe Features with Diabetes Mellitus (PDM)	*p*
Mother-Infant dyads no.	158	111	
Gender (males) no. (%)	74 (47)	62 (56)	NS
Birthweight (g) mean ± SD	2582 ± 587	3120 ± 739	0.001
Gestational age (w) mean ± SD	36 ± 1	36 ± 1	NS
Gestational age 34 weeks no. (%)	30 (19)	17 (15)	NS
Gestational age 35 weeks no. (%)	41 (26)	23 (21)	NS
Gestational age 36 weeks no. (%)	44 (28)	33 (29)	NS
All preterm no. (%)	115 (73)	73 (66)	NS
Full-term no. (%)	43 (27)	38 (34)	NS
Intrauterine Growth			
Appropriate for gestational age no. (%)	106 (67)	62 (56)	NS
Large for gestational age no. (%)	17 (11)	38 (34)	0.0001
Small for gestational age no. (%)	35 (22)	11 (10)	0.008
Admission to NICU no. (%)	70 (44)	64 (58)	0.04
Neonatal hypoglycemia no. (%)	32 (20)	46 (41)	0.0002
Infant length of stay (d) mean ± SD	6 ± 6	6 ± 6	NS
Discharged home with mother no. (%)	110 (70)	77 (69)	NS

Table 3: Prior BF experience and early BF among women with preeclampsia with severe features with and without diabetes.

	Severe Features (PSF)	Severe Features with Diabetes Mellitus (PDM)	*p*
Mother-Infant dyads no.	158	111	
Primiparous no. (%)	103 (65)	50 (45)	0.001
Multiparous no. (%)	55 (35)	61 (55)	0.001
Prior breastfeeding no. (%)	38 (69)	29 (48)	0.02
Time to First Breastfeeding			
< 1 hour no. (%)	29 (18)	16 (14)	NS
1-2 hours no. (%)	11 (7)	4 (4)	NS
3-6 hours no. (%)	24 (15)	8 (7)	NS
7-24 hours no. (%)	30 (19)	18 (16)	NS
≥ 25 hours no. (%)	33 (21)	33 (30)	NS
Never breastfed no. (%)	31 (20)	32 (29)	NS
Received lactation consult no. (%)	138 (87)	86 (77)	NS

Table 4: Intention to BF and BF at discharge for women with preeclampsia with severe features with and without diabetes.

	Severe Features (PSF)	Severe Features with Diabetes Mellitus (PDM)	*p*
Mother-Infant dyads no.	158	111	
Prior Breastfeeding no. (%)	27 (17)	23 (22)	NS
Mother-Infant Feeding Preference			
Intention to breastfeed no. (%)	127 (80)	79 (71)	NS
Intention to feed both no. (%)	6 (4)	12 (11)	NS
Intention to feed formula no. (%)	25 (16)	20 (18)	NS
Infant Feeding at Discharge			
Exclusive total no. (%)	58 (37)	20 (18)	0.001
Direct BF no. (%)	25 (43)	8 (40)	NS
Direct BF & Expressed breast milk no. (%)	17 (29)	4 (20)	NS
Expressed breast milk no. (%)	16 (28)	8 (40)	NS
Partial total no. (%)	52 (33)	40 (36)	NS
Direct BF & Formula no. (%)	28 (54)	19 (48)	NS
Direct BF, Expressed breast milk & Formula no (%)	14 (27)	9 (23)	NS
Expressed breast milk & Formula no. (%)	10 (19)	12 (30)	NS
Formula feeding no. (%)	48 (30)	51 (46)	0.01
Any breastfeeding no. (%)	110 (70)	60 (54)	0.01

(30 vs. 46%, p 0.01) while partial BF was similar (33 vs. 36%). Thus, BF initiation (any BF) occurred in 70% of PSF and in 54% of PDM ($p < 0.01$).

Exclusive BF at discharge resulted from direct BF or from direct BF with EBM or from EBM alone in both preeclampsia groups. Twenty-nine of 58 (50%) infants in the PSF group and 12 of 20 (60%) in the PDM group that fed exclusive human milk at the time of discharge received formula supplementation during their hospital stay. Sixteen (10%) infants in the PSF group and 6 (5%) in the PDM group received DHM during their hospital stay.

There were 127 women from the PSF group and 79 from the PDM group who antenatally intended to BF and who at discharge BF exclusively (43 vs. 25%), BF partially (39 vs. 46%) and FF (18 vs. 29%). Of 18 women (6 from the PSF group and 12 from PDM group) who antenatally intended to BF and FF, at the time of discharge, 11 FF, 4 BF partially and 3 BF exclusively. Of the 25 women from the PSF and 20 from the PDM group who prenatally declared their intention to FF at discharge all but one FF. There were 43 of 111 (39%) women from the PDM group who also had CHTN, this sub-group compared to the 68 PDM without CHTN showed lower intention to BF (59 vs. 79%, p 0.02) and higher FF at discharge (58 vs. 38%, p 0.03).

Discussion

The incidence of preeclampsia complicating pregnancies remains constant around the world [1-4,11] and its successful management is often based on indicated early delivery which continues to result in a high rate of premature births [4,5]. Thus, it may be anticipated that NICU admissions will remain high especially for infants born to women with PSF alone or superimposed on preexisting conditions such as CHTN or diabetes mellitus [6-9,21,22]. Prematurely born infants are challenged by a myriad of developmental obstacles and illnesses that could affect initiation and continuation of BF [7-9,23-25]. Women affected by GDM or PGDM and their infants experienced morbidities and co-morbidities unique to their condition that may explain fewer vaginal deliveries, obesity, fetal macrosomia, neonatal hypoglycemia, and increased admissions to the NICU [8,9,25,26]. Additionally, admission to the NICU, even if temporary, diminishes opportunities for critical physiological mother-infant interactions, while creating anxiety and negative emotions in the mother [7,13,26,27]. Pregnant women with diabetes, especially with PGDM, have concerns about their own health and that of their unborn child and when preeclampsia develops, this additional stressor further challenges their emotional well-being [28].

Despite the heterogeneity of morbidities and co-morbidities associated with high risk obstetrical pregnancies, intention to BF, a strong predictor of BF initiation, remains similar to that of the general maternal population [6-9,29,30]. While intention to BF was similar, there was a discordance between intention to BF and the rate of exclusive or partial BF at discharge [7-9,31]. In 2015, approximately 83% of the general maternal population in the U.S. initiated breastfeeding at discharge from the hospital [30]. In contrast, the rate of BF initiation for the PSF group (70%) is suboptimal, while the rate for the PDM group (54%) is even lower and more concerning.

Regardless of health or medical conditions, pre-

eclampsia is more common in primiparous women. Multiparous women in the PDM group had less prior BF experience than multiparous women in the PSF group. Recently, we reported that multiparous women with PGDM without prior BF experience constituted a group at higher risk of BF initiation failure [32]. We assumed in both investigations that multiparous women who declared no prior BF experience had either not intended to BF or had attempted to BF and were unsuccessful.

In normal as well as in high risk pregnancies certain hospital practices may delay infant feeding (i.e., cesarean delivery, eye prophylaxis, vitamin K administration, blood glucose monitoring). While some of these practices may be postponed others may be unavoidable especially in infants born to women with PDM who are at greater risk for hypoglycemia [6-9,22]. It has been well established that early BF or, if BF is not possible, FF may prevent or correct hypoglycemia and increase BF initiation at discharge from the hospital [25,27,33]. When hypoglycemia persists, transfer of the infant to the NICU is required and maternal-infant separation becomes unavoidable [26].

Cesarean delivery, a traditionally recognized obstacle to early mother infant interactions, remains consistently high among women with PSF and even higher among those with PDM [7,34]. Cesarean birth is known to prevent or delay skin-to-skin contact, reduce the incidence of early BF and increase the likelihood of formula supplementation [12,25,32-36]. The lower BF rates we observed following cesarean delivery among PSF and PDM women compared to vaginal birth highlight the severity of the mother's illnesses and/or their infant morbidities and may contribute to BF initiation failure. The major disruption in mother-infant contact following birth arose from the need for immediate transfer of symptomatic prematurely born infants to the NICU.

The efficacy of magnesium sulfate given postpartum to prevent seizures in women with PSF and PDM is well established [1-4]. Unfortunately, effects on the mothers' sensorium during the infusion make mother-infant separation more common [14]. The number of women who had skin-to-skin contact and/or BF during the first postpartum day in the PSF and PDM groups attest to hospital practices that include close monitoring of mothers and infants with complex conditions at the delivery room and adjacencies [26,27]. Delays in mother-infant interactions are common following the delivery of women with PSF and PDM as shown by the fact that less than 25% were able to BF or have skin-to-skin contact with their infants during the first two postpartum hours.

Both the American Academy of Pediatrics and the Academy of Breastfeeding Medicine strongly recommend exclusive BF for all healthy infants during birth hospitalization and beyond [24,37-39]. However, these organizations wisely acknowledge that other nutritional options may be needed to temporarily replace or supplement BF under well-defined circumstances (i.e., late preterm infants). Healthcare providers must be aware that delays associated with some morbidities will further the need for alternatives to direct BF [24,37,39]. Due to their clinical condition not all women with PSF or PDM are able to BF shortly after birth. In that case, our practice is to provide mother's milk, if obtained antenatally, EBM if tolerated, DHM if feasible or infant formula if prescribed by a physician [24,40,41].

It is well established that milk expression by hand or with an electrical pump may help mothers overcome obstacles to successful BF and therefore increase BF duration [42,43]. Our finding that women with PSF or PDM who intended to BF had a BF initiation (exclusive or partial BF) rate of 82 and 71%, respectively, is significant because it compares well with that of the general maternal population [30]. However, this success is tempered by the fact that only 43% of women in the PSF group and 25% of women in the PDM group who antenatally intended to BF exclusively BF their infants at the time of discharge. In line with current literature, we hoped that women with direct BF with or without EBM at discharge would continue to provide exclusive or partial BF [41-44]. Women in either preeclampsia group who BF exclusively with EBM without any direct BF is concerning since available literature is pessimistic about BF duration in these cases [23,45-49]. Several investigators cautioned that exclusive EBM feeding should be recommended for full-term and premature infants only when medically necessary and not as a substitute for feeding directly from the breast [47,48]. On the other hand, some authors suggest that early initiation of EBM after delivery has been shown to increase milk production among mothers of very low birth weight infants and that EBM in conjunction with direct BF could be beneficial [43,44].

The data on partial BF (direct BF or EBM with formula) raises similar concerns about BF duration following discharge, but it is possible that with support and guidance, this feeding modality could potentially evolve into exclusive BF. Earlier investigators, however, noted that EBM alone, without directly BF at 3 days postpartum could associate with shorter BF duration [50]. More recently, other authors reported that pumping without feeding at the breast is associated with shorter milk feeding duration and early introduction of formula as compared to feedings at the breast with or without pumping [49,51]. We agree with Keim, et al. [49] in that some dyads that cannot feed at the breast initially, an eventual transition is possible and should be encouraged [49,52].

Limitations to this investigation are those inherent to the retrospective design and the lack of follow-up information regarding infant feeding after discharge. Also, the definition of BF initiation at discharge may be

applicable only to women with high risk obstetrical conditions for whom early mother-infant contact may be delayed. The strength of this investigation rests on the size of the obstetrical and neonatal population and the fact that the data were obtained directly from medical records, not via post-delivery maternal questionnaires.

In conclusion, traditionally recognized obstacles to BF initiation appeared to affect both groups, however, several were more common in the PDM group where women were more often multiparous without prior BF experience, obese, had fewer vaginal deliveries, more CHTN, neonatal hypoglycemia and admissions to the NICU. Although intention to BF was similar, BF initiation rates for both the PSF and PDM groups were below that of the general maternal population with the BF initiation rate for the PDM group particularly concerning. Women with PSF and PDM represent groups that will require novel and targeted interventions to improve BF initiation rates.

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