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Correlation of Maternal Obesity and Exclusive Breastfeeding

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ABSTRACT

Background: Many factors affect exclusive breastfeeding, include method of delivery, parity, maternal age and education, smoking, ethnicity, pregnancy complications, infant health, and environmental factors such as hospital practices, and social support.
Recently, maternal obesity has been suggested as a risk factor for poor breast-feeding practices whose role has not yet been completely determined. This study was conducted to evaluate the effect of maternal obesity on exclusive breastfeeding.
Methods: This Cross sectional study was carried out among women receiving prenatal care by midwives at the health center of Neyshabur University of Medical Sciences during 2014-2016. Data regarding maternal and neonatal variables were gathered. To analyze the data, Chi-squared test was run to determine the association between categorical variables.
Results: Planned feeding method, educational level, employment status, and gestational age were the four strongest predictors for poor breast-feeding practices at discharge. Method of delivery, gestational diabetes, and maternal hypertension and maternal obesity were significantly associated with exclusive breastfeeding at discharge ($p<0.05$).
There was not any significant relationship between neonatal weight and gestational age with exclusive breastfeeding at discharge ($p<0.05$), but there was a significant association between gestational age and exclusive breastfeeding at discharge ($p=0.042$).
Conclusion: This study indicated that maternal obesity is an important predictor of exclusive breastfeeding at discharge.

Keywords: Exclusive breast-feeding, Maternal obesity, Newborn

Introduction

Despite the well-known benefits of exclusive breastfeeding, maternal breastfeeding is still far from the goals set by the World Health Organization. (1–4).

Many factors affect exclusive breastfeeding, include mod of delivery (Cesarean v/s Normal delivery), parity, maternal age and education, smoking, ethnicity, nipple sores, nipple pain, pregnancy complications, infant health, and environmental factors such as hospital practices, and social support (5, 6,7).

Based on some Descriptive studies, maternal obesity has also been associated with poor breast-feeding and initiation and duration of breast-feeding were poor among mothers who had a body mass index (BMI) above the normal range (8).

Overweight (BMI of 26.1–29.0) and obesity (BMI >29.0) were negatively associated with the duration of exclusive breast-feeding . The World Health Organization (WHO) described three preferable obesity classes: obese class I (body mass index [BMI]: 30.034.9 kg/m^2), obese class II (BMI: 35.0-39.9 kg/m^2), and obese class III (BMI ≥ 40.0 kg/m^2) (9).

Australian researchers reported that among mothers who successfully breast-fed ≥ 2 wk, those who were heavier 1 mo after delivery (BMI > 26) had a risk of early breast-feeding cessation that was 1.5 times that of those who were lighter (BMI ≤ 26) (10).

Also, investigators in the USA reported that both overweight and obese mothers had a significantly higher risk of failing to initiate

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breast-feeding successfully than did normal-weight women [odds ratios of 2.54 (P < 0.05) and 3.65 (P < 0.0008), respectively] (11).

Contrary to these studies, some other researchers did not find an inverse correlation between BMI before pregnancy and breast-feeding practices (12, 13).

Due to the increase the prevalence of obesity in Iranian mothers and the decrease in exclusive breastfeeding rates we test the hypothesis of Correlation of maternal obesity and exclusive breastfeeding in Neyshabur Neyshabur University of Medical Sciences in Iranian.

Methods

This Cross sectional study was carried out among women receiving prenatal care by midwives at the health centers of Neyshabur University of Medical Sciences during 2014-2016. The target Sampling was cluster type. We randomly selected 4 health centers.

Population consisted of pregnant women receiving prenatal care from midwives at health centers. The exclusion criteria included missing data on height and/or weight, last recorded weight > 14 days prior to delivery, a medical history of surgery, stillbirth, multiple pregnancy, or mathernal age < 16 years. Women were also excluded if their baby was born with major congenital anomaly or less than 37 weeks gestation.

The sample size was limited to the number of eligible deliveries with an available medical record. Informed written consent was obtained from the subjects; we also attained the approval of the Ethics committee of Neyshabur University of Medical Sciences, Neyshabur, Iran.

Exclusive breastfeeding is defined by the World Health Organization (WHO) as an infant's consumption of breast milk only and no other liquids or solids (not even water), allowing only for small amounts of medical fluids (14). We determined exclusive breastfeeding (EBF) as an infant's consumption of breast milk only and partial breastfeeding as an infant's consumption of breast milk and formula.

The WHO BMI categories were used, and pre-pregnancy BMI was coded as overweight, obese class I, obese class II, or obese class III.

Pre-pregnancy weight was self-reported. Height was either measured (75.0%) or self-reported (25.0%). The amount of weight gained during pregnancy was estimated by subtracting pre-pregnancy weight from weight recorded at the last prenatal care visit, which by study design was no more than 14 days prior to delivery. The participants were grouped based on high, average, and low BMI and proportionate weight gain during pregnancy. The outcome variable was EBF status at hospital discharge. The infants were classified as receiving supplement (i.e. Formula), being exclusively breastfed, and both.

Socioeconomic and demographic covariates were selected from previous studies examining factors associated with exclusive breastfeeding (15). These included maternal age, marital status (single, married, or other [including divorced, widowed, and separated]), educational level, and employment status (employed/unemployed).

Infant sex, infant birth weight, gestational age, and size for gestational age at birth (small for gestational age [SGA], appropriate for gestational age [AGA], large for gestational age [LGA]) were included in the analyses. Size for gestational age was calculated based on the American Academy of Pediatrics (16).

The considered maternal medical factors included parity, (classified as 1, 2, 3, or 4+ children), route of delivery (vaginal, scheduled cesarean, or unscheduled cesarean), gestational diabetes mellitus in the current pregnancy (yes/no), gestational hypertension in the current pregnancy (yes/no), tobacco use in the past year (yes/no), and trimester of the first prenatal care visit (first/second).

The Chi-squared test was run for determining the association between categorical variables. The variables identified as potential confounders in the existing literature were entered into the multivariable model. The findings from the full and reduced models were very similar, and thus, we reported the results from the full model below. Analyses were conducted using SPSS, version 20. P-value less than 0.05 was considered statistically significant.

Results

One thousand mothers were enrolled in this study. A final sample of 300 overweight and obese women was Obtained after excluding the ineligible subjects. About 70% (140 mothers) reported prenatally that they planned to exclusively breastfeed in hospital, and 30% planned to formula feed only or partially breastfeed. Further, 40% of the participants were obese, and of these, 23% were obese class I, 11% obese class II, and 6% obese class III. Nearly 30% of the women (60 mothers) gained weight in accordance with gestational weight gain guidelines.

The participants ranged in age from 18 to 49

Table 1. Subjects' characteristics based on breastfeeding status at hospital discharge (N = 480)

Breastfeeding status at hospital discharge	Total[a]	Not exclusive breastfeeding	Exclusive breastfeeding	P-value[b]
Gestational weight gain and prepregnancy BMI factors				
Pregnancy BMI, mean (SD), kg/m2	29.4 (4.33)	30.84 (6.2)	28.69 (6.4)	.01
Pregnancy weight, mean (SD), lbs	100.33 (21.34)	98.86 (28.39)	90.56(18.63)	<.0001
Pregnancy BMI, No. (%)				.042
Obese class III	57 (19)	29 (50.87)	28(49.12)	
Obese class II	53 (17)	21 (39.62)	32 (60.37)	
Obese class I	90 (30)	22 (24.44)	68 (75.55)	
Overweight	100 (33.3)	18 (18)	82 (82)	
Planned feeding No. (%)			<.0001	
Formula only/partial breastfeeding	110 (36.66)	70(63.63)	40 (36.36)	
Breastfeeding only	190 (63.33)	20 (10.52)	170 (89.47)	
Sociodemographic factors				
Mother's age, mean (SD), y	28.35 (6.4)	26.24 (4.9)	29.96 (8.5)	.045
Other (widowed/separated)	14 (4.66)	12 (85.71)	2 (14.28)	0.001
Illiterate	20 (6.66)	14 (70)	6 (30)	
Primary education	102 (34)	70 (68.62)	30 (29.41)	
High school graduate	150 (50)	50 (33.33)	100 (66.66)	
University graduate	28 (9.33)	3 (10.71)	25 (89.28)	
Employment status, No. (%)				0.002
Unemployed	210 (70)	30 (14.28)	180 (85.71)	
Employed	80 (26.66)	60 (74.8)	20 (25.2)	
Route of delivery				0.001
Vaginal	180 (60)	25 (13.88)	155 (86.11)	
Scheduled cesarean	80 (26.66)	50 (62.5)	30 (37.5)	
Unscheduled cesarean	40(13.33)	5 (12.5) 35	(87.5)	
Gestational diabetes mellitus				0.45
No	276 (92)	78 (28.26)	198 (71.73)	
Yes	24(8)	12 (50)	12 (50)	
Current pregnancy hypertension				0.05
No	260 (86.66)	64 (24.61)	196 (75.38)	
Yes	40 (13.33)	26 (65)	14 (35)	
Infant outcomes				
Infant gender, No. (%)				0.92
Males	158 (52.66)	44 (27.84)	114 (72.15)	
Females	142 (47.33)	46 (32.39)	96 (67.60)	
Infant weight, mean (SD), g	3320 (325)	3298 (330.9)	3460 (514.36)	0.98
Gestational age, mean (SD), wk.952	40.23 (2.6)	41.2 (0.60)	39.96 (2.33)	0.95
Size for gestational age, No. (%)				0.042
AGA	270 (90.0)	67 (77.8)	207 (22.2)	
LGA	22 (5.6)	17 (85.2)	5 (14.8)	
SGA	8 (4.4)	6 (76.2)	2 (23.8)	

Abbreviations: AGA: appropriate for gestational age; BMI: body mass index; BP: blood pressure; EBF: exclusively breastfeeding; LGA: large for gestational age; SGA: small for gestational age; P-value is for t-test or $\chi 2$ test/Fisher's exact test.

years (mean: 28.3±7.2 years). The participants had singleton pregnancy, had high school education. The median number of parities was 3, and 47% of the participants gave birth via cesarean section (Scheduled or unscheduled). In terms of other maternal bio-medical factors, 4.8% had gestational diabetes, 3% had gestational hypertension, no one had used tobacco in the past year, and more than one-third received their first prenatal care visit in the second trimester.

The mean weight of the infants was 3320±325 g. There was a significant association between exclusive breastfeeding and pregnancy weight such that those who failed to exclusively breastfeed had an average pre-pregnancy BMI of 28.3 kg/m^2, which was significantly higher than in those who exclusively breastfed. There were also significant positive associations between breastfeeding status and planned feeding method, educational level, and parity (Table 1).

There was a significant association between pre-pregnancy BMI and breastfeeding status at discharge. The rate of failure to exclusively breastfeed was the highest among obese class III women, followed by obese II, obese I, and overweight women. The percentages of women failing to exclusively breastfeed were 50.87%, 39.62%, 24.44%, and 18% for obese III, obese II,

obese I, and overweight women, respectively.

Obese III women had the highest level of failing to exclusively breastfeed versus the obese I and obese II participants. Planned feeding method, educational level, employment status, and size for gestational age were the four strongest predictors of failing to exclusively breastfeed at discharge. Those women who planned to formula feed only or partially breastfeed had high level of failing to exclusively breastfeed at discharge compared with those who planned to provide breast milk only. Unemployed women with higher educational levels and appropriate for gestational age infants showed a high rate of successful breastfeeding. With higher number of parities, the probability of exclusive breastfeeding increased.

Discussion

Planned feeding method, educational level, employment status, and size for gestational age were the four strongest predictors of failing to exclusively breastfeed at discharge. The route of delivery, gestational diabetes mellitus, and hypertension in current pregnancy were significantly associated with exclusive breastfeeding at discharge. There was not a significant association between neonatal weight or gestational age with exclusive breastfeeding at discharge, but when we calculated size for gestational age, there was a significant association between this factor and exclusive breastfeeding at discharge.

Martinez showed that class II obesity and prenatal intention to use formula or partially breastfeed were the strongest predictors of failure to exclusively breastfeed at hospital discharge, which is almost in line with our findings (17). In Martinez study, less than one-fourth of the women were exclusively breastfeeding at hospital discharge, but in our study, two-thirds of the women were exclusively breastfeeding at hospital discharge; this difference could be attributed to cultural differences.

Chapman in 2009 in Hartford found that just 44.9% of women were EBF in hospital (18). One study in Australia, where 75.6% of infants had EBF at hospital discharge, respectively. Breastfeeding duration was positively associated with maternal feeding attitudes and negatively associated with breastfeeding problems in the first four weeks, maternal smoking status, introduction of a pacifier, and early return to work (19).

Liu et al. in the US showed reduced odds of breastfeeding initiation among very obese (i.e., BMI ≥ 35.0, equivalent to obese class II or III) white women; however, that study did not examine obese class III women (20). Baker et al. in Denmark also found that obese class II women had the lowest rate of "ever fully breastfeeding" in the past six months (2% had EBF), followed by obese class III (94.0%), obese class I (94.9%), overweight (96.3%), normal weight (97.7%), and underweight women (98.2%) (21). Although the outcome examined by Baker et al. was EBF status at any time in the past six months rather than at hospital discharge, the pattern of breastfeeding outcome based on obesity class was similar to that in our study.

In the present study, cesarean section was associated with decreased rate of breastfeeding initiation compared to vaginal delivery. Planned feeding method was the strongest predictor of EBF at hospital discharge in our study. Breastfeeding plans clearly matter when it comes to successful initiation and continuation. This finding provides insight into breastfeeding education and intermediary support should include high-risk populations, that is, overweight and obese women who plan to breastfeed for a shorter duration and have weaker breastfeeding intention than their normal-weight peers (8, 9).

Martinez also examined whether geographical origin was associated with EBF at hospital discharge and showed that women of Mexican origin performed weaker in exclusive breastfeeding at hospital discharge compared to Puerto Rican women (17). Several similar factors may help clarify these findings. Compared to Puerto Rican women, women of Mexican origin may have had a stronger social support that encouraged breastfeeding (22). A study in this population in Connecticut showed that Latinas with low levels of education (regardless of their country of origin) were more likely to continue breastfeeding after hospital discharge compared to those from other origins (18).

Limitations

We obliged to rely on self-report data. We were unable to examine EBF behavior at hospital discharge in relation to educational level that could affect our findings.

Conclusion

This study indicated that maternal obesity is a risk factor and predictor of EBF at hospital discharge.

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Conflicts of interests

The authors declare no conflict of interest in this study.

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