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THE EFFECT OF PRE-PREGNANT MATERNAL OBESITY ON THE BREASTFEEDING PRACTICES IN DAVANGERE, KARNATAKA - A RETROSPECTIVE COHORT STUDY

Arun Daniel J[1], Pragati V Chavan[2]

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Author's Affiliation:
[1]Postgraduate Student; [2]Associate Professor, Community Medicine, SSIMS & RC, Davangere, Karnataka

Correspondence:
Dr Arun Daniel. J
drdanfi@yahoo.co.in

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ABSTRACT

Introduction: Women who are obese before pregnancy are less likely to initiate breastfeeding and are more likely to encounter feeding difficulties and breastfeed for shorter durations versus normal-weight women.

Objectives: This study was conducted to compare breastfeeding practices among pre-pregnant obese versus normal-weight mothers in first 6 months post-partum.

Methodology: A retrospective cohort study was conducted in the field practice areas of a tertiary care hospital, Davangere, between February 2013 and August 2013. A cohort of 90 pregnant women with known pre-pregnant BMI were classified into Obese woman (n=30, pre-pregnant BMI ≥30 kg/m^2) and Non-Obese women, (n=60, 18.5 kg/m^2≥ pre-pregnant BMI≤25 kg/m^2). Each Obese woman was pair matched with two controls (non-obese) based on the socio-demographic variables and followed up till 6 months post-partum. Association of various breastfeeding practices with pair-matched, obese and non-obese women was studied.

Results: Obese women delayed breastfeeding initiation (OR=21.07, p<0.001), breastfed for shorter duration (OR=13, p=0.001) and less frequently (OR=5.31, p<0.001), perceived delayed 'Coming in' (OR=8.65, p<0.001), experienced improper sucking/latching (OR=8.3, p<0.001) and used formula feed (OR=8.2, p=0.001) compared to non-obese women.

Conclusion: Obese women showed breastfeeding practices, unhealthy to their breastfed child, compared to non-obese women, which demands professional health intervention.

Key words: Pre-pregnant BMI, obese and non-obese, Breastfeeding practices

INTRODUCTION

The term "nutrition" applies to all nourishment considered in relation to body's needs from day one of life.(1) Considering that breast milk is the only nourishment a human would get from day one till six months of life, it is a mandate to look for its proper provision to any child, both in terms of quality and quantity. Breastfeeding ensures the best possible health as well as the best developmental and psychosocial outcomes for the infant. (2) Unfortunately, Obesity related perinatal morbidity does not end with birth, but continues to affect the maternal-infant dyad. Women who are obese or overweight before pregnancy are less likely to initiate breastfeeding early. (3) They are also more likely to encounter difficulties and breastfeed for shorter durations when compared to normal-weight women. (3, 4, 5) The mechanism by which being obese negatively affects lactational performance is unknown and likely to be multifactorial in

origin. Increasing prepregnant BMI has been associated with delayed lactogenesis. [5, 6] The aim of this study was to compare breastfeeding practices among prepregnant obese versus normal-weight mothers in first 6 months post-partum.

METHODOLOGY

Institutional ethics committee approval was obtained prior to start of the research. The study demanded a comparison of breastfeeding practices during the first six months post-partum period, using data (BMI, number of previous abortions, pregnancy related morbidities/ systemic illness, pre-natal/ peri-natal complications during delivery) which was expected to be remembered by the mother from her pre-pregnant period. This would have been a source for a lots of recall bias. Hence a retrospective cohort study to compare the breastfeeding practices among 30 Obese woman (pre-pregnant BMI ≥30 kg/m^2) with 60 Non-Obese women (18.5 kg/m^2≥ pre-pregnant BMI≤25 kg/m^2) was conducted by following a record- based cohort of 143 women who registered their pregnancy at respective health centers in urban (Basha nagar) and rural (Lokikere) field practice areas, delivered a baby on any date between February and August, 2013 and breastfeeding at present. From the cohort of 143 women, 90 mothers were selected after excluding those women, who delivered pre-term or congenitally abnormal child, with pre-pregnant BMI not known or not possessed a thai (MCH) card and who did not fit into the pairing criteria for matching. All pre-pregnancy data was obtained from Ante-Natal register and Thai cards, including pre-pregnant height and weight, from which BMI was calculated. Participants completed an oral questionnaire regarding Breastfeeding practices namely initiation, duration, frequency of feeding, 'coming in' (i.e time when a mother perceived increased milk secretion), latching/ sucking, quantity of feed (perception of 'fed well' i.e mother perceived a good flow of milk to the child for a longer time till the child was satisfied) and use of formula feeds. Each case was pair-matched with two controls by the pairing criteria: Maternal residence (Lokikere or Basha Nagar), parity (primiparous or multiparous), maternal age (±5 years), socio-economic status (I-V) and maternal level of education (illiterate, middle school, high school, graduate), presence or absence of systemic diseases and abortions (yes/no).

Analysis: The data entry was done in Excel 2007. Data are presented as means ± SDs and as proportions (percentages) for continuous and categorical variables respectively. Unmatched exposed and non-exposed variable analysis was done without pair-matching, using multiple logistic regression in SPSS trial version 20. Pair matching using the above mentioned pairing criteria was done in Excel 2007. Matched exposed and non-exposed variable analysis was done by Conditional Logistic Regression analysis using Cox proportional hazards regression in SPSS and association of various breastfeeding practices with pair-matched, obese and non-obese women were studied.

RESULTS

The 143 women in the cohort were residents at field practice areas (either Basha nagar or Lokikere), with mean age 24.27± 2.79 years, majority of them being Hindus (65%), drawing a monthly income of Rs.5694 (±1910) on an average, with a pre-pregnancy BMI ranging from 16 to 40 (mean BMI= 26.36±5.48 kg/m^2).

Participant characteristics like mean age, socio-economic status, education level, parity did not show much difference in proportion, between cases and controls. [Table 1] The mean BMI was 33.39±2.83 kg/m^2 among the obese and 22.81±1.81 kg/m^2 among the non-obese women.

Table 1: Participant characteristics

Variables	Cases (obese) (*n*= 30)	Controls (non-obese) (*n*= 60)
Age Mean± SD	24.07±2.91	24.32± 2.79
Educational level		
Higher Secondary	12 (40)	25 (41.7)
Middle school	8 (26.7)	15 (25)
Illiterate	10 (33.3)	20 (33.3)
Socio-economic status		
Upper class	22 (73.3)	44 (73.3)
Upper Middle class	7 (23.3)	14 (23.3)
Lower middle class	1 (3.3)	2 (3.3)
Parity		
Primigravida	14 (46.7)	29 (48.3)
Multigravida	16 (53.3)	31 (51.7)
Pre-pregnant BMI*	33.39±2.83	22.81±1.81
Birth weight of child*	3.17±0.52	2.53±0.33
Mode of delivery		
Normal vaginal	20 (66.7)	54 (90)
Instrumental	10 (33.3)	6 (10)

Figure in parenthesis indicate percentage; *Mean± SD

Unmatched exposed and non-exposed variable analysis results: [Table 2]

Majority of obese women (53.3%) initiated breastfeeding only after 72 hours when compared to non-obese women (3.3%) [OR = 102, CI= 17.07, 609.63]. More obese women (43.3%) fed their child only for 1 -3 minutes whereas non- obese women (55%) fed for 10 minutes. [OR = 42.9, CI= 7.37, 249.59]. The obese mothers fed their child less than 8 times per day (66.7%) whereas the non- obese women

(78.3%) fed more frequently (>8 times per day). [OR = 7.231, CI= 2.723, 19.19]. More obese mothers (33.3 %) felt that they did not 'breastfeed well' even once when compared to non- obese women (6.7%). [OR = 11.94, CI= 3.05, 46.73]. Obese women experienced more feeding difficulties like improper sucking or latching (26.7%) and perceived insufficient milk production (50%) as the child continued to suck even after their breasts were empty compared to non- obese women.[OR = 17.86, CI= 5.2, 61.32]. Perceiving 'coming in' was not much different between obese and non-obese women. Obese women (43.3%) used formula feeds more than non-obese women (5%) [OR = 14.53, CI= 3.7, 57.02].

Pair-matched, exposed and non-exposed variable analysis using Conditional logistic regression [Table 3]

Obese women delayed breastfeeding initiation [OR=21.07, CI 4.95, 89.63], breastfed for shorter duration (<2 minutes/ feed) [OR=13, CI 2.93, 57.6] and less frequently (<8 times/ day) [OR=5.31, CI 2.09, 13.51], perceived lesser 'fed well' (< 2 times/day) [OR=5, CI 1.57, 15.94], experienced improper sucking/latching [OR=8.3, CI 2.79, 24.64], perceived delayed 'Coming in' [OR=8.65, CI 2.92, 25.62] and used formula feed [OR=8.2, CI 2.33-28.89] compared to non-obese women.

Table 2: Unmatched exposed and non-exposed variable analysis using Logistic Regression

Variables	Cases (obese) (*n*= 30)	Controls (non-obese)(*n*= 60)	Odds Ratio	95.0% CI for Exp(B)	p value
Breastfeeding initiation					
Immediate	4 (13.3)	51 (85)	1		
1-72hours	10 (33.3)	7 (11.7)	18.214	4.478 - 74.090	<0.001
> 72 hours	16 (53.4)	2 (3.3)	102	17.066 - 609.629	<0.001
Duration of feeding					
1-3 minutes	13 (43.3)	2 (3.3)	42.900	7.374 - 249.589	<0.001
3-5 minutes	11 (36.7)	17 (28.3)	4.271	1.276 - 14.296	0.019
5-10 minutes	1 (3.3)	8 (13.3)	0.825	0.084 - 8.080	0.869
>10 minutes	5 (16.7)	33 (55.1)	1		
Frequency of feeding					
<8 times/day	20 (66.7)	13 (21.7)	7.231	2.723 - 19.198	<0.001
>8 times/day	10 (33.3)	47 (78.3)	1		
'Fed well'					
none	10 (33.3)	4 (6.7)	11.944	3.053 - 46.727	<0.001
1-5 times	11 (36.7)	13 (21.7)	4.043	1.376 - 11.874	0.011
>5 times	9 (30)	43 (71.6)	1		
Sucking/latching					
Improper sucking/latching	8 (26.7)	4 (6.7)	14.286	3.393 - 60.140	<0.001
sucks even after breasts are emptied	15 (50)	6 (10)	17.857	5.200 - 61.318	<0.001
Sucks till breasts are empty	7 (23.3)	50 (83.3)	1		
Perceiving 'Coming in'					
within 24 hours	19 (63.3)	51 (85)	1		
in 24-72 hours	7 (23.3)	6 (10)	3.132	0.933 - 10.512	0.065
>72 hours	4 (13.4)	3 (5)	3.579	.732 - 17.497	0.115
Formula feeds					
Not used	17 (56.7)	57 (95)	1		
used	13 (43.3)	3 (5)	14.529	3.702 - 57.021	<0.001

(Figure in parenthesis indicate percentage), 1= reference

Table 3: Pair-matched exposed and non-exposed variable analysis using Conditional Logistic Regression

Variables	-2 Log Likelihood	p value	Exp(B)	95.0% CI for Exp(B)
Delay in Breastfeeding initiation	30.703	<.0001	21.070	4.953 - 89.630
Duration of feeding < 3 minutes	47.511	0.001	13.000	2.934 - 57.607
Frequency of feeding < 8 times/ day	51.343	<.0001	5.314	2.089 - 13.518
'Fed well' < 2 times/ day	57.412	0.007	5.000	1.568 - 15.942
Improper Sucking / latching	46.150	<.0001	8.293	2.791 - 24.643
Delay in perceiving 'Coming in'	45.073	<.0001	8.646	2.918 - 25.617
Use of formula feeds	51,438	0.001	8.195	2.325 - 28.894

DISCUSSION

Stage I lactogenesis, or secretory initiation, includes prenatal physical changes that prepare breast tissue for milk synthesis through Colostrum production. It occurs during pregnancy and is defined by the differentiation of mammary alveolar epithelial cells into specialized secretory cells, termed lactocytes. At this stage, the mammary gland is capable of producing small quantities of immunoglobulin-rich mammary secretion, known as Colostrum. [6] In our study, we observed 86.7% of obese women did not initiate breastfeeding immediately, whereas 85 % of

non obese women initiated breastfeeding within one hour of birth. [Table 2] Only 3 out of the 26 obese group mothers who delayed initiation had reasons like child kept in NICU (2) and hospital procedural delay (1). All others (23) had insufficient milk production as the reason. This can be attributed to the delay in lactogenesis in obese women leaving the child insufficiently accessible to its most valuable first immune juice, the Colostrum. A study by Pang et al of 1109 mother-infant dyads examined the relationship between maternal overweight and obesity and successful initiation of breastfeeding before hospital discharge. Women who were overweight and obese attempted breastfeeding at the same rate as women of normal weights (ORs = 1.2 and 1.1, respectively); however, significantly fewer women who are overweight and obese breastfed at hospital discharge (ORs = 2.54 and 3.56, respectively). [7]

Stage II lactogenesis, or secretory activation, is defined as the initiation of copious milk secretion. It is stimulated by prolactin and begins approximately 2 days after birth. Lactose is the predominant milk osmolyte; thus, it is sudden increase in intracellular lactose that draws water into the lactocyte and accounts for the new mother's noticeable increase in milk volume that is the hallmark of stage II lactogenesis. [8, 9] Maternal perception of the milk "coming in" is strongly correlated with biochemical and milk transfer indicators of stage II lactogenesis [10, 11, 12] The perception of onset of stage II lactogenesis beyond 72 h postpartum is considered delayed onset of lactogenesis (delayed OL) [5, 12] In humans, this process is triggered by the withdrawal of progesterone after delivery of the placenta. [8] Adipose tissue concentrates and stores progesterone, leading to higher serum progesterone levels in women who are obese. [9] In our study we observed that obese women perceived 'coming in' late (>72 hours i.e delayed OL) compared to non-obese women [OR= 8.65, p<0.001] [Table 3]

Leptin is an appetite-suppressing hormone produced by adipose tissue and the placenta. It functions as a growth hormone in pregnancy, with maternal levels dropping at birth. Women who are obese are hyperleptinemic. Leptin inhibits oxytocin-induced contractions of the myometrium in vitro. Because the milk ejection reflex is triggered by oxytocin, high leptin levels in obesity might inhibit lactogenesis by diminishing milk ejection. [9] In our study we found more incidence of Instrumental deliveries among obese women (33%) compared to non-obese women (10%). Leptin inhibition of oxytocin inhibition can be a major factor for such increased incidence. Similarly obese women showed reduced duration [OR=13 p= 0.001], frequency [OR=5.314, p<0.0001], quantity ('fed well' <2 times/day) [OR=5, p=0.007] of feeding and more dependency on formula feeds [OR=8.2, p=0.001] compared to non-obese women. [Table 3] Stephanie et al in their study showed obese women were more likely (P = 0.04, unadjusted) to try milk expression and were less likely (P = 0.01, unadjusted) to express milk successfully. [13]

Anecdotal reports from lactation consultants indicate that overweight or obese women, perhaps due to their larger breast size, have more difficulty positioning the newborn at the breast, and this may contribute to delayed OL and other breastfeeding difficulties. [14] In our study also we observed more improper sucking and latching problems experienced by obese women [OR=8.3, p<0.0001] than non-obese women.

CONCLUSION

Pre-pregnant maternal obesity has strong association with unhealthy breastfeeding practices in the first 6 months post-postpartum when exclusive breastfeeding is advocated. This would have serious implications on the nutritional well-being of the infant fed by the obese women.

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