

IMPACT OF MATERNAL BMI IN INFANT BMI AT 6 MONTH OF AGE A CROSSECTIONAL STUDY IN A TERTAIRY CARE CENTRE

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Introduction

Breastfeeding is the first and most important intervention for a child's survival, good growth, and development.¹ Optimal breastfeeding can prevent nearly 12% of deaths, or roughly 823,000 deaths, in children under the age of five each year. This includes starting breastfeeding as soon as possible after birth, providing exclusive breastfeeds for the first six months of life, adding complementary feeds after that time, and continuing breastfeeding until age two.^{2,3} Only 40% of all Indian newborns are nursed within an hour of birth, and only 50% of children under 6 months are exclusively breastfed, according to the National Family Health Survey (NFHS-4) 2015–2016.⁴

The mother struggles with unpleasant and unknown states like feelings of helplessness and weakness, anxiety, appetite and sleep disorders, lack of confidence, lack of pleasure, and parents' feelings of inadequacy, just as she hopes for joyful experiences with the birth of her newborn. At this stage, an emotional and mental physiological crisis happens, which can lead to bewilderment and a change in the mother's identity. In the meantime, the mother is more vulnerable than ever to mood changes and emotional crises like depression, anxiety, and stress during the puerperal period due to the loss of stored energy caused by pharmacological side effects, fatigue, the length of delivery, and issues occurred as a result of the processes of lactation and childbirth. The postpartum emotional upheaval and mood swings can be detrimental to the mother's ability to be a good parent as well as the infant's development and nutrition. The development and growth of infants depend on proper nutrition in the early years of life, and breastfeeding has a positive impact on the growth and development of lactating infants. In addition to physiological aspects, the mother's social and psychological well-being also affects her ability to successfully breastfeed. Anxiety among mothers may operate as a risk factor on its own for failure to breastfeed exclusively for the first six months.⁵

The aim of this study was to address infant nutrition and to analyze the effect of antenatal and postnatal maternal nutritional and psychosocial status on breastfeeding practices and on infant nutrition.

What we already know: We already know the importance of maternal nutrition during pregnancy and lactation period. We have many programs running in India for the improvement of maternal and child health. We already know the importance of exclusive breastfeeding till 6 months. NFHS (2015-2016) shows only 50% of infants exclusively breastfeed till 6 months.

What this article adds: In this article, we address the impact of multiple factors (maternal age, maternal education, maternal nutrition, family income, number of antenatal visits attended, psychosocial status of mother) on exclusive breastfeeding up to 6 months of age. We also add intervention to find out its outcome at 6 months. We gave support, nutritional and IYCF counselling to all mothers and infants in every month.

Objectives:

1. To determine relationship between nutritional status of mothers on nutritional status of infant at 6 months of age
2. To identify factors affecting exclusive breastfeeding up to 6 months.

Materials and methods

Study Design:

Prospective Observational Cohort Study

Study Period:

The study was conducted from July 2022 to Jan 2023

Study Area:

Immunization clinic, Department of paediatrics Kalawati saran children's hospital.

Study Population:

Women attending immunization clinic for vaccination of their infants.

Sample Size

The sample size (n) is calculated according to the formula: $n = z^2 * p * (1 - p) / e^2$

Where: z = 1.96 for a confidence level (α) of 95%, p = proportion (expressed as a decimal),

e = margin of error.

z = 1.96, p = 0.83, e = 0.05

$n = 1.962 * 0.83 * (1 - 0.83) / 0.052$

$$n = 0.542 / 0.0025 = 216.82$$

$$n \approx 217$$

Accounting for loss to follow up ~ 10% sample size is calculated as 240.

Study procedure Willing women was recruited and serially followed up to 6 months. Data obtained from patients was filled in interview style based proforma which will include demographic details like name, age, address, family details- nuclear or joint family, educational status of the woman and her spouse, occupation of the woman and her husband, socioeconomic status of family, medical history. Their nutritional and psychosocial status was assessed. Intervention was done in the form of time-to-time guidance and counselling. Iycf and nutritional Counselling was given on each immunization visits.

Assessment of Nutritional status:

Height of the patient was recorded with Seca stadiometer and weight was taken with Seca weight machine at the time of visit. Her pre-pregnancy weight or weight before 20 weeks of gestation if known was recorded to calculate BMI and nutritional classification done according to Asian BMI cut offs (BMI categories of Asian populations : <18.5, 18.5-23, 23-27.5, and ≥ 27.5 for underweight, normal weight, overweight and obese respectively). Old records and ANC card was used for assessment for anaemia. Assessment of psychosocial status: Following psychosocial variables was assessed using self-rated scales:

Postnatal Depressive symptoms: It was assessed using Edinburg Postnatal Depression scale in Hindi

Postnatal Anxiety symptoms: It was assessed using Generalized Anxiety Disorder Scale 2 in Hindi

All these scales have no copyright issues and are validated in Hindi

Establishment of breastfeeding was assessed as follows:

Baby taking 8-10 feeds daily, sleeping well after breastfeeding.

Baby passing urine 7-8 times daily

Position and attachment for effective breastfeeding was assessed at the time of interview.

Ethical Consideration

Approval of the study was taken from the Institutional Ethical Committee of the Lady Harding Medical College (LHMC/IEC/2022/03/75). Written informed consent taken from the parents/guardian of the study subjects.

Result:

Table 1: - Distribution of Patient characteristics in study population.

Patient characteristics	Frequency (n)	Percentage (%)
Age(years)		
<=19	12	5.00%

>19	228	95.00%
Father's education		
Illiterate	18	7.50%
Upto 8th	43	17.92%
More than 8th	179	74.58%
Mother's education		
Illiterate	24	10.00%
Upto 8th	46	19.17%
More than 8th	170	70.83%
Religion		
Hindu	192	80.00%
Muslim	47	19.58%
Punjabi	1	0.42%
Income		
<=10000	87	36.25%
>10000 to 20000	112	46.67%
>20000 to 30000	24	10.00%
>30000	17	7.08%
Antenatal visits		
1	14	5.83%
2	31	12.92%
3	36	15.00%
>=4	159	66.25%
Anemia		
Normal	78	32.50%
Mild anemia	65	27.08%
Moderate anemia	91	37.92%
Severe anemia	6	2.50%
Birth weight(kg)		
1.8-<2.5 kg	36	15.00%
>=2.5 kg	204	85.00%
Baby gender		
Female	106	44.17%
Male	134	55.83%
Body mass index(kg/m²) <20 weeks		
<18.5 kg/m ² {Underweight}	25	10.42%
18.5-22.9 kg/m ² {Normal}	125	52.08%
23-27.5 kg/m ² {Overweight}	73	30.42%
>=27.5 kg/m ² {Obese}	17	7.08%
BMI (kg/m²) at 6 months		

<18.5 {Underweight}	kg/m ² 6	2.50%
18.5-22.9 kg/m ²	{Normal} 82	34.17%
23-27.5 kg/m ²	{Overweight} 119	49.58%
>=27.5 kg/m ²	{Obese} 33	13.75%
GAD-7 scale at 6 weeks		
No risk GAD {<2}	196	81.67%
Moderate risk GAD {<3}	31	12.92%
Severe risk GAD {>=3}	13	5.42%
EPDS at 6 weeks		
No risk {<=8}	236	98.33%
Moderate risk {9-11}	4	1.67%
Hypothyroidism	26	10.83%
Family history	18	7.50%
Hypertension	56	23.33%
Well attached	240	100.00%
Well positioned	224	93.33%
Exclusively breast feeding at 6 months	239	99.58%

Majority of patients 95% were above 19 years and 5 % mothers were ≤ 19 years. 10 % mothers were illiterate never went to school despite of living in national capital region and under many government programs like Sarv Sikhsha Abhiyan and many more. 19.1% were 8th pass and majority of the population were educated more than 8 standards. 36.25% population were living their livelihood in < 10000 monthly family income, 46.67% were in the 10000 to 20000 and others monthly family income was higher than 20000.

33.75% of subjects were not attended minimum recommended 4 ANC visit. More than 60% of mothers having anaemia during pregnancy. 15% of baby born less than 2500 kg birth weight, which is a risk factor for growth failure.

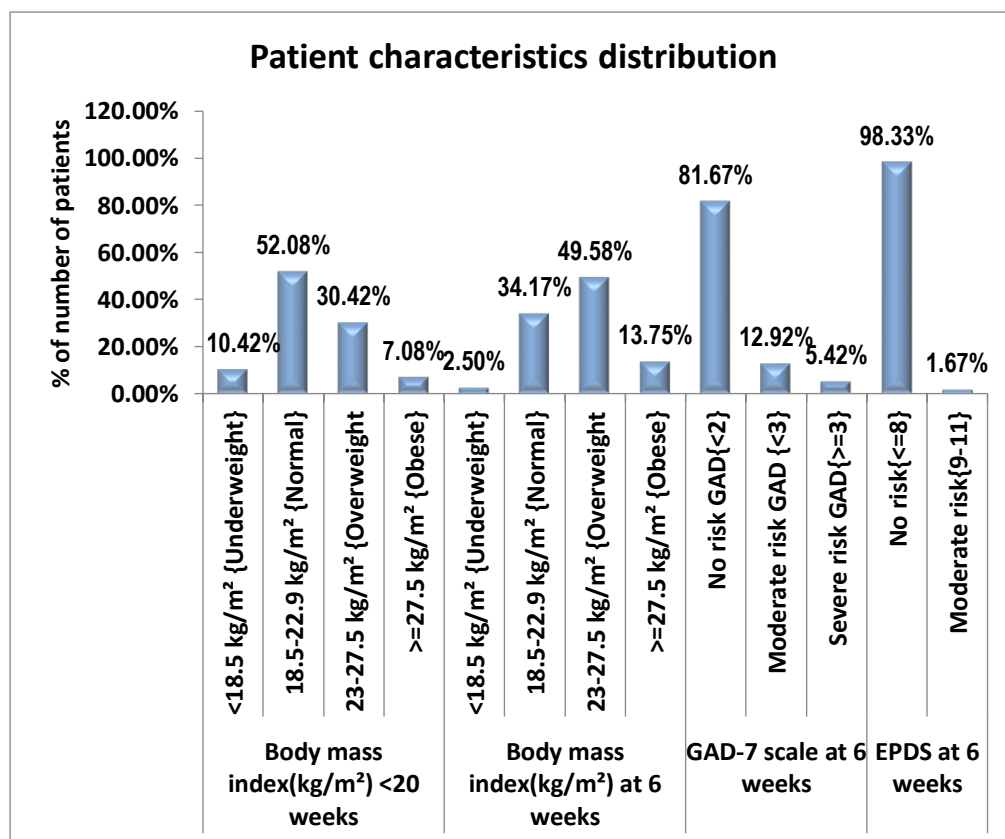


Figure 1: - Patient characteristics distribution.

We found 10.42% mother were underweight according to Weight recorded from the ANC card at < 20 week and 2.50 % mothers were underweight at 6 months follow up. 12.92 % mother were having symptoms of anxiety and 5.42% mother were at sever risk for anxiety. 1.67% of mother were at risk postnatal depression.

Table 2: -Association of patient characteristics with birth weight(kg).

Patient characteristics	1.8-<2.5 kg(n=36)	>=2.5 kg(n=204)	Total	P value
Age(years)				
<=19	2 (5.56%)	10 (4.90%)	12 (5%)	0.697*
>19	34 (94.44%)	194 (95.10%)	228 (95%)	
Mother's education				
Illiterate	5 (13.89%)	19 (9.31%)	24 (10%)	0.347*
Upto 8th	9 (25%)	37 (18.14%)	46 (19.17%)	
More than 8th	22 (61.11%)	148 (72.55%)	170 (70.83%)	
Income				
<=10000	15 (41.67%)	72 (35.29%)	87 (36.25%)	0.496*
>10000 to 20000	15 (41.67%)	97 (47.55%)	112 (46.67%)	
>20000 to 30000	2 (5.56%)	22 (10.78%)	24 (10%)	
>30000	4 (11.11%)	13 (6.37%)	17 (7.08%)	
BMI (kg/m²) <20 weeks				
< 18.5 kg/m ² {Underweight}	7 (19.44%)	18 (8.82%)	25 (10.42%)	0.043*
18.5-22.9 kg/m ² {Normal}	13 (36.11%)	112 (54.90%)	125 (52.08%)	
23-27.5 kg/m ² {Overweight}	15 (41.67%)	58 (28.43%)	73 (30.42%)	
>=27.5 kg/m ² {Obese}	1 (2.78%)	16 (7.84%)	17 (7.08%)	
Antenatal visits				
1	2 (5.56%)	12 (5.88%)	14 (5.83%)	0.053*
2	10 (27.78%)	21 (10.29%)	31 (12.92%)	
3	4 (11.11%)	32 (15.69%)	36 (15%)	
>=4	20 (55.56%)	139 (68.14%)	159 (66.25%)	
Hypothyroidism				
No	32 (88.89%)	182 (89.22%)	214 (89.17%)	1*
Yes	4 (11.11%)	22 (10.78%)	26 (10.83%)	
Anemia				
Normal	11 (30.56%)	67 (32.84%)	78 (32.50%)	0.573*
Mild anemia	10 (27.78%)	55 (26.96%)	65 (27.08%)	
Moderate anemia	13 (36.11%)	78 (38.24%)	91 (37.92%)	
Severe anemia	2 (5.56%)	4 (1.96%)	6 (2.50%)	

* Fisher's exact test

We found strong positive association in between child birth weight and mothers' nutritional status at <20th week of their pregnancy and antenatal visit attended during pregnancy.

Table 3: -Association of patient characteristics with exclusively breast feeding at 6 Months.

Patient characteristics	Exclusively breast feeding given(n=239)	Exclusively breast feeding not given(n=1)	Total	P value
Age(years)				
<=19	12 (5.02%)	0 (0%)	12 (5%)	1*
>19	227 (94.98%)	1 (100%)	228 (95%)	
Antenatal visits				
1	13 (5.44%)	1 (100%)	14 (5.83%)	0.058*
2	31 (12.97%)	0 (0%)	31 (12.92%)	
3	36 (15.06%)	0 (0%)	36 (15%)	
>=4	159 (66.53%)	0 (0%)	159 (66.25%)	
Income				
<=10000	87 (36.40%)	0 (0%)	87 (36.25%)	1*
>10000 to 20000	111 (46.44%)	1 (100%)	112 (46.67%)	
>20000 to 30000	24 (10.04%)	0 (0%)	24 (10%)	
>30000	17 (7.11%)	0 (0%)	17 (7.08%)	
Body mass index(kg/m²) at 6 months				
<18.5 kg/m ² {Underweight}	6 (2.51%)	0 (0%)	6 (2.50%)	0.504*
18.5-22.9 kg/m ² {Normal}	81 (33.89%)	1 (100%)	82 (34.17%)	
23-27.5 kg/m ² {Overweight}	119 (49.79%)	0 (0%)	119 (49.58%)	
>=27.5 kg/m ² {Obese}	33 (13.81%)	0 (0%)	33 (13.75%)	
Anemia				
Normal	78 (32.64%)	0 (0%)	78 (32.50%)	1*
Mild anemia	65 (27.20%)	0 (0%)	65 (27.08%)	
Moderate anemia	90 (37.66%)	1 (100%)	91 (37.92%)	
Severe anemia	6 (2.51%)	0 (0%)	6 (2.50%)	
GAD-7 scale at 6 weeks				

No risk GAD {<2}	195 (81.59%)	1 (100%)	196 (81.67%)	1*
Moderate risk GAD {<3}	31 (12.97%)	0 (0%)	31 (12.92%)	
Severe risk GAD {>=3}	13 (5.44%)	0 (0%)	13 (5.42%)	
EPDS at 6 weeks				
No risk {<=8}	235 (98.33%)	1 (100%)	236 (98.33%)	1*
Moderate risk {9-11}	4 (1.67%)	0 (0%)	4 (1.67%)	

* Fisher's exact test

Education during pregnancy will have positive impact on exclusive breastfeeding rate of study population as we found positive correlation between establishment of EBF till 6 months of infants age and ANC visit attended by the women during pregnancy.

Discussion:

Several psychological factors have an impact on a woman's intention to breastfeed as well as the subsequent start and length of nursing. According to research, maternal confidence in breastfeeding is linked to initiating the practice¹⁴ and maintaining it for a longer period of time.¹⁵⁻¹⁷ The likelihood of having the intention to breastfeed¹⁴, starting to breastfeed¹⁸, and continuing to breastfeed¹⁹ is also correlated with the mother's attitudes and beliefs regarding the advantages of nursing. Finally, the mother's decisions to start and maintain nursing are influenced by exposure to breastfeeding role models²⁰ as well as increased social support from others in the mother's social network.^{14,15,21}

In 2013 Raghavan V et al. conducted a study, Prevalence and Predictors of First Hour Initiation of Breastfeeding and Exclusive Breastfeeding at Six Weeks in a Tertiary Care Setting. 83% of the infants that were monitored for 6 to 8 weeks were exclusively breastfed. 43% of infants received breast milk replacements on day one, which became a reliable indicator of failure to maintain exclusive breastfeeding at 6 weeks.²²

In 2011-2012 Meshram I.I. et al. found that Only 22% of mothers started breastfeeding within one hour of giving birth, while 44% started within three hours. Pre-lacteal usage was seen to be high (44.7%). Only 41% of newborns were nursed exclusively during the first six months. Mothers belonging to scheduled castes and tribes were substantially more likely to initiate

breastfeeding promptly and continue it exclusively for six months. They are more likely to begin supplemental feeding on time.²³

In 2015 Patel A et al. studied 255,495 live-born mother-infant pairs in 106 geographic clusters at 7 research facilities in 6 nations (India [2 sites], Zambia, Kenya, Argentina, Pakistan, and Guatemala). Factors and rates for the 42-day postpartum exclusive breastfeeding sub-study were evaluated from a sub-sample of 105,563 individuals. Nulliparity, low birth weight, Caesarean section, resuscitation with bag and mask, and failure to lay the baby on the mother's chest after delivery were all related to growing failure to commence early breastfeeding. The locations had different variations in the factors that contributed to the failure to achieve exclusive breastfeeding at 42 days.²⁴ They discovered that breastfeeding rates in the study group were lower when depressive symptoms were present, despite the fact that nursing had significant health advantages.

The association between depressive symptoms and breastfeeding at 6 and 12 weeks postpartum was examined in a study by Hatton DC et al. in 2005. Six weeks after delivery, the Edinburgh Postnatal Depression Scale (EPDS) was completed by mail. Twelve weeks following delivery, an outpatient visit included the EPDS. At 6 weeks postpartum, but not at 12 weeks²⁵, they discovered an inverse link between depressive symptoms and breastfeeding.

According to a meta-analysis in underdeveloped nations, children of mothers who experienced postpartum depression were more likely to be underweight and stunted.²⁶ In addition, moms with depression were more likely to stop breastfeeding their children and not seek the proper medical attention.²⁷

A study conducted by Chudasama R.K. et al. in 2009 found a delivery interval of more than 24 months, primiparity, lower socio-economic status, early maternal age, occupation as a risk factor for early weaning and low paternal education.²⁸

In 2008 Suksham J et al in Government Medical College & Hospital, Chandigarh, conducted a study on mothers of term or late pre-term healthy neonates, enrolled within 48 h after delivery and followed up till 6th week postnatally. Proportion of EBF decreased to 1st week (95%), 2nd (93.3%) and 6th 75.8% respectively²⁹.

In our study, we found 10.42% mothers were underweight according to the Weight recorded in the ANC card at <20 week and 2.50 % of mothers were underweighting at 6 months follow up. percentage decrease by a good amount with the intervention. 33.75% of subjects were not

attended the minimum recommended 4 ANC visit. More than 60% of mothers have anaemia during pregnancy. 15% of baby born less than 2500 kg birth weight, which is a risk factor for growth failure. 12.92 % mother were having symptoms of anxiety and 5.42% mother were at sever risk for anxiety. 1.67% of mother were at risk postnatal depression. 99% of exclusive breastfeeding achieved after the only counselling intervention on the study subjects.

Conclusion: This study identified that a maternal malnutrition increases the risk of growth failure in the infants. Lesser the number of ANC visit attended in pregnancy will also lead to low-birth-weight infants and increases growth failure risk. This indicates maternal education during ANC, help to ensure proper nutrition and supplementation of mothers, which is essential for proper maternal nutrition, infant's growth and development. Health awareness given during ANC visits will affect the nutrition of mother and also positive impact on the exclusive breast feeding up to 6th months of infants age. Parentage of exclusive breastfeeding were found well at 6th months follow up in studied mother due to IYCF counselling & support to mothers at each and every immunization visits. Exclusive breastfeeding till 6 months is important for all infants to reduce infant growth failure in early age.

Limitation: we were not able to assess psychosocial status at 20 weeks.

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