ORIGINAL ARTICLE

# SEVERE MATERNAL MALNUTRITION: WHETHER THE BABIES ARE AT RISK OF BOTTLE FEEDING?

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## ABSTRACT

**Objectives:** This research paper aims at finding the association between maternal malnutrition with their choice of feeding practices (breast, bottle, or mix) of infants who are under 6 months of age.

**Material and Methods:** This cross-sectional study was undertaken from 1st March 2019 to 31st August 2019 at the inpatient and outpatient of the pediatric department of Khyber Teaching Hospital Peshawar. The data was collected on a predesigned proforma recording demographic characteristics of the responders and their feeding practices; exclusive breastfeeding or mixed (breast+ bottle) feeding. Additionally, maternal malnutrition was assessed by calculating their BMI. The data were analyzed in SPSS version 23. Chi-squared was used to analyze the data.

**Results:** A total of 278 mothers of infants 1-6 months were interviewed about their feeding practices and BMI recorded. The association between maternal malnutrition and breast/bottle feeding was insignificant (P>0.05).

**Conclusion:** There is no association between maternal malnutrition and the choice of bottle feeding of infants.

**Keywords:** Infants, bottle feeding, breastfeeding, maternal malnourishment, body mass index

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## INTRODUCTION

It is a well-established fact that breastfeeding is the ideal way of feeding newborn babies and infants. It is one of the most important factors which affects the health of children in low to middle-income countries.[1] Annually, 60% of 10.9 million under-five deaths globally are due to malnutrition. Of these, over two-thirds of the deaths are accounted for by sub-optimal feeding practices in the first year of life.[2]

After birth, growth faltering may begin at 3-5 months of life and becomes more prominent from 6 to 18 months. During this time, the young child is exposed to many infectious diseases, such as diarrhea, that have an adverse effect on growth.[3] Promotion of exclusive breastfeeding for the first 6 months of life and continued breastfeeding for at least the first 2 years, has a beneficial effect on the growth of the young child[3].

Bottle feeding should be avoided as far as possible. Feeding babies with bottles carries an increased risk of infections as compared to breastfeeding.[3] This in turn can lead to increased morbidity and mortality in young children. There are various factors responsible for bottle feeding including personal choices, employment, lack of education, maternal death, and situations in which breastfeeding is contraindicated.[4,5]

Maternal malnutrition is a major indicator of maternal food insecurity and is measured in terms of Body Mass Index (BMI) which is a ratio of the weight and height of the individual. It is prevalent (10-19%) in most countries with South Asia as one of the most affected (20%).[6]It is an established fact that malnourished mothers produce "insufficient milk". Moreover, a series of studies have proven that maternal malnutrition increases the risk of prematurity, low birth weight, and intrauterine growth restriction.[7,8] These small babies borne by malnourished mothers, later on, are at increased risk of stunting, wasting, and being underweight.[9]

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The quantity and quality of milk produced by malnourished mothers are not much different from that of well-nourished mothers until and unless it is severe malnutrition (BMI ≤18.5 kg/m$^2$).[4] Studies have proven that severe maternal malnutrition can lead to deficiency in certain micronutrients like Thiamine, Riboflavin, vitamin B6, B12, A, D, selenium, and Iodine.[9]

There are lots of speculations about the correlation between bottle feeding and maternal malnutrition. However, little empirical research has been done to find the association between malnutrition in mothers and bottle feeding in their babies. The aim of this study is to find the association between maternal malnutrition and their choice of feeding practices. By finding this fact we would be able to address maternal malnutrition in the context of bottle feeding which is not the ideal way of feeding babies and infants. This study was intended to find the association between severe maternal malnutrition and bottle or mixed (breast and bottle) feeding in their babies.

## MATERIAL AND METHODS

This study was carried out in the Pediatric department, at Khyber Teaching Hospital Peshawar from 1st March 2019 to 31 August 2019. Mothers of children aged 1-6 months were the study responders. As per the official record of Outpatient and inpatient data of the Pediatric department of Khyber Teaching Hospital, a total number of 650 children constituted the population frame. A sample size of 278 was worked out for a total population of 650 using the formula: $n = r+1(p^*) (1-p^*) (Z \text{ beta} + Z \text{ alfa}/2)^2/r(p1-p2)^2$

The inclusion criteria of the respondents for the current study included mothers with Babies 1-6 months old who were being bottle fed or having mixed feeding (both breast+ bottle) for at least 1 month or being exclusively breastfed by their mothers for at least 1 month. infants presenting to both inpatient and outpatient departments of Khyber Teaching Hospital Peshawar were included in the study.

Exclusion criteria included mothers with Twins or triplets babies, infants born with extremely low birth weight (ELBW is <1kg at birth), and those having congenital malformations or metabolic disorders (e.g., Galactosemia).

The data was collected on a well-designed proforma covering the study variables like demographic characteristics of the responders and their choice of feeding i.e., breastfeeding or mixed (breast+ bottle) feeding. Anthropometric measurements for maternal malnutrition variable, their weight and heights were taken using a digital weighing scale and stadiometer respectively. BMI was calculated using the standard formula. Furthermore, the BMI was categorized into severely malnourished mothers and non-severely malnourished mothers by taking 18.5 as the cut point.

The collected data was coded, edited, and entered into SPSS software (SPSS 23) for its univariate and bivariate analysis. At the univariate level, diagnostic statistics were carried out for demographic variables. In addition, frequencies and percentages proportions of the measures pertaining to breast and bottle-feeding behavior of mothers were worked out. Moreover, the Chi-square test was used to ascertain the association between maternal BMI and bottle/breastfeeding behavior at the bivariate level.

The research followed American Psychology Association standards for ethics in medical research. For this purpose, approval of ethical aspects of the study was solicited from Institution Research Ethical Board. Prior to data collection, the purpose of the study was explained to the responders and informed consent was taken. Moreover, the respondents were ensured of their confidentiality during the research. The respondents were free to respond to some or all of the questions or quit the survey at their will.

## RESULTS

A total of 278 mothers were interviewed and anthropometric measurements were taken. Table 1 shows the age, height weight, and BMIs of the mothers. The ages of the mothers are shown in Figure 1. The weight of mothers ranged from 40kg to 110kg (Mean 56.6kg) and height ranged from 1-2 meters (mean 1.56m). The BMI of the respondents ranged from 16-44.6 (mean 23.38). The ages of the babies were from 1-6 months (mean 3 m). Out of 278 mothers, 135 (48.6%) were exclusively breastfeeding their babies while 143 (51.4%) were either bottle-feeding or mixed feeding their babies (Table 4).

Maternal severe malnutrition according to WHO (BMI ≤ 18.5) was found in 80(28.7%) mothers while the remaining 198 (71.2%) were not severely malnourished Figure 2. Out of severely malnourished mothers, 40(50%) were exclusively breastfeeding and 40(50%) were not exclusively breastfeeding. In well-nourished mothers, 95(48%) were exclusively breastfeeding their babies while

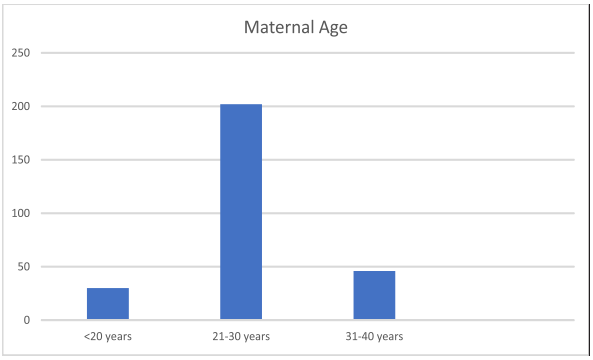


**Fig 1: figure showing the maternal age**

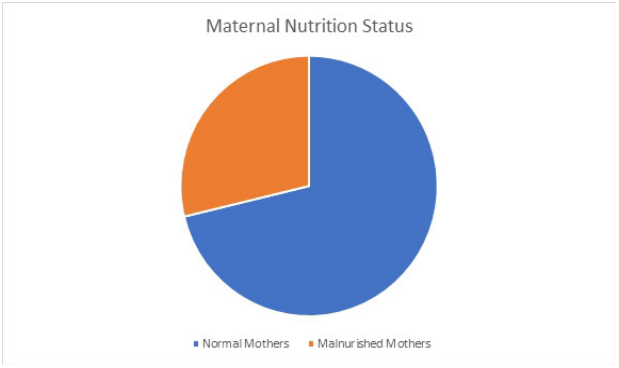


**Fig 2: Maternal malnutrition**

**Table 1: Descriptive statistics of age height weight and BMI of mothers and age of infants**

| | Age of mothers (years) | Weight of mother (Kg) | Height of mother (meter) | BMI of mother | Age of infant (months) |
|---|---|---|---|---|---|
| Mean | 26.6043 | 56.6205 | 1.56 | 23.3805 | 3.054 |
| Std. Deviation | 4.92927 | 12.79563 | .061 | 5.12189 | 1.5191 |
| Minimum | 16.00 | 40.00 | 1 | 16.00 | 1.0 |
| Maximum | 40.00 | 110.00 | 2 | 44.60 | 6.0 |

**Table 2: Frequency of mothers breast feeding their infants**

| | Frequency | Percent |
|---|---|---|
| Yes | 135 | 48.6 |
| No | 143 | 51.4 |
| Total | 278 | 100.0 |

**Table 3: Association between severe maternal malnutrition and bottle or mixed feeding.**

| Maternal BMI | Bottle or mixed feeding | Exclusive Breast feeding | Total (percentage) | Statistical results |
|---|---|---|---|---|
| Malnourished | 40 (50.0%) | 40 (50.0%) | 80 (100.0%) | X2= 0.093<br>P = 0.760 |
| Well-nourished | 103 (52.0%) | 95 (48.0%) | 198 (100.0%) | |
| Total | 143 (51.4%) | 135 (48.6%) | 278 (100.0%) | |

103(52%) were using a bottle or mixed feeding technique. In total 278 responders, 135(48.6%) were breastfeeding while 143 (51.4%) were bottle or mixed feeding Table 4. The p-value was calculated as 0.760 which was not significant. Table 5 shows the association of maternal malnourishment status and breast/bottle feeding practice being non-significant (P>0.05).

## DISCUSSION

In our study out of 278 mothers, 135(48%) mothers were exclusively breastfeeding their babies which correlates with the international data from Africa, Asia, the Caribbean, and Latin America (47-57%).[5]

Severe maternal malnutrition (BMI <18.5) was found in 28.7% (80) of our respondents. Amongst these severely malnourished mothers, 50% (40) were exclusively breastfeeding while 50% (40) were using a bottle or mixed (breast + bottle) feeding technique. Of mothers who were not severely malnourished (BMI ≥ 18.5) 48% (95) were exclusively breastfeeding their babies while 52% (103) were not. So, there was not much difference in feeding practices of severely malnourished and but the relatively well-nourished mothers were not exclusively breastfeeding their infants. The same was noted by in a study that suggested socio-economic background influences mothers' choice of feeding practice.[6] They reported that the mothers who choose mixed or bottle feeding and do not breastfeed their children are because of maternal age, the number of pregnancies, time of first breastfeeding ≥ 12 hours, and early introduction of complementary foods which can positively affect maternal BMI.[6] Increased

maternal BMI is thought to be negatively correlated with decreased breastfeeding of babies immediately after birth. The same was found in our study. Though maternal malnutrition has no correlation with breastfeeding, normal or high BMI is negatively associated with breastfeeding initiation and intensity as pointed out by many researchers.[7,8]

Different studies have shown that maternal nutritional status influences the growth of a baby both prenatally and postnatally.[12, 13] Maternal BMI though has no association with the feeding practices like exclusive breastfeeding or mixed feeding though maternal BMI if high would lead to a higher BMI of the infant as reported by Fanny Aldana-Parra et al.[13] Some of the studies have shown that maternal malnutrition has little effect over the composition and volume of breast milk until and unless it is severe malnutrition.[14] This finding supports our study's data which indicates no significant difference between malnourished and well-nourished mothers regarding their feeding practices.

While Allen LH et al suggested that the composition is affected but the volume is not by maternal nutrition which in turn will affect the infants.[15] Bzikowska-Jura A suggested in two studies that the choice of infant feeding practice, the composition of milk, and quantity is not affected by maternal BMI same as this study. Thus, maternal malnutrition doesn't affect the choice of feeding practices they make for their infants.[17, 18]

## CONCLUSION

There is no statistically significant correlation between the choice of feeding practice and maternal malnutrition.

Mobilization of mass media and initiating educational programs for awareness raising in masses, provision of incentives for breastfeeding women, revitalizing family institutions for the revival of breastfeeding culture, and mobilizing religious and political leadership for promotion of breastfeeding were some of the policy recommendations in light of study findings.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

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|---|---|
| **Rehman SKU:** | Conceiving the idea, data collection |
| **Amir S:** | Literature search writing up the article and Statistical analysis |
| **Shah SIA:** | Data collection |
| **Asad Ullah:** | Literature search |
| **Bashir H:** | Bibliography |
| **Bahar S:** | Data collection |

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.