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Effectiveness of community-based personalized breastfeeding assessment and intervention in improving child growth among 0–4 months infants

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ABSTRACT

Background: Breastfeeding is critical for infant health, yet suboptimal practices persist due to sociocultural and structural barriers, especially in low-resource urban settings. This study evaluated the effectiveness of community-based, personalized breastfeeding assessments and interventions in improving infant growth among infants aged 0–4 months residing in urban slums of Jabalpur, India. **Aims and Objectives:** The primary objective was to assess breastfeeding techniques and child growth among lactating mothers, with a focus on intervening using correct positioning and attachment methods when necessary. A secondary objective was to monitor infant growth biweekly for 2 months among mothers initially exhibiting improper techniques. **Materials and Methods:** A community-based interventional study was conducted in three urban slum areas, enrolling 61 lactating mothers. Breastfeeding practices were assessed using structured questionnaires and direct observation. Mothers practicing suboptimal techniques received immediate corrections through hands-on demonstrations and educational videos. Infant growth was monitored biweekly using WHO growth charts and data were analyzed with SPSS 20 using a mixed-effects regression model. **Results:** Results indicated that initially, only 3% of mothers practiced effective breastfeeding. However, after four follow-up visits, 70% of mothers had adopted proper techniques. Significant improvements were observed in recognizing hunger cues, hand hygiene before feeding, and breastfeeding frequency. Infant weight gain met expectations in a majority of cases, with maternal education emerging as an influential factor. **Conclusion:** The prevalence of effective breastfeeding practices in Jabalpur's slum populations is very low. Repeated, targeted interventions by community health workers can enhance breastfeeding techniques and contribute to improved child growth outcomes.

Key words: Breastfeeding; Infant; Growth; Community health services; Health promotion; Counselling; Infant nutritional physiological phenomena; Maternal-child health services; Patient-centered care; Program evaluation

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INTRODUCTION

Breastfeeding is vital for infant health, fostering physiological, psychological, psychosocial, and physical bonding between mother and child. Colostrum, the baby's first immunization, provides essential antibodies, Vitamin A, and protective factors.[1] Studies show that breastfed infants experience healthier growth, improved cognitive

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development, and reduced risks of obesity, diabetes, and infections.[2-4] Non-breastfed infants face higher mortality rates, particularly in developing countries, with increased susceptibility to diarrhea, pneumonia, and chronic diseases such as type 1 diabetes, celiac disease, ulcerative colitis, and Crohn's disease.[5,6] Recognizing these issues, the World Health Organization (WHO) recommends immediate initiation, exclusive breastfeeding for 6 months, and continued breastfeeding for at least 2 years with optimal complementary feeding.[7] WHO advocates exclusive breastfeeding for the first 6 months to promote healthy growth and lower infant morbidity and mortality.[8] However, global breastfeeding rates remain suboptimal due to a range of sociocultural, economic, and structural barriers, particularly in low-resource settings.[9]

Community-based breastfeeding interventions have emerged as a promising strategy to address these barriers. By offering individualized support, education, and real-time problem-solving, these interventions can empower mothers to initiate and sustain breastfeeding, leading to improved nutritional outcomes and growth trajectories for infants.[10] Community health workers (CHWs) and peer counselors embedded within the local context are particularly well-positioned to deliver these interventions, fostering trust and continuous support.[11]

Evidence suggests that early breastfeeding assessment, coupled with tailored interventions, can mitigate common breastfeeding challenges such as latching difficulties, inadequate milk supply, and maternal fatigue, which often contribute to premature breastfeeding cessation.[12] Such assessments allow for timely, context-specific guidance, enhancing maternal confidence and breastfeeding self-efficacy, which are crucial determinants of breastfeeding success.[13]

This study aims to evaluate the effectiveness of community-based personalized breastfeeding assessment and intervention in improving child growth among infants aged 0–4 months. By examining growth indicators such as weight gain, length, and head circumference, the study seeks to contribute valuable insights into the potential of localized, adaptive breastfeeding support to enhance early childhood health outcomes.

Aims and objectives

The primary objective was to assess breastfeeding techniques and child growth among lactating mothers, with a focus on intervening using correct positioning and attachment methods when necessary. A secondary objective was to monitor infant growth biweekly for 2 months among mothers initially exhibiting improper techniques.

MATERIALS AND METHODS

Jabalpur is situated on the banks of the Narmada River in Madhya Pradesh, central India. There are many urban slum areas in Jabalpur. The study was conducted in three urban slum areas of Jabalpur – Sainala, Ramnagar, and Tilawa – from August 11 to March 11, 2023.

This was a community-based interventional study. A total of 20 study areas were randomly selected by dropping a pencil on a map of Jabalpur. The study areas were determined based on where the tip of the pencil landed. The study participants were lactating mothers and their infants aged 0–4 months. All lactating mothers with children under 4 months old in the selected urban areas were included in the study. However, any female who had moved out of the study area during follow-up or whose child had congenital anomalies or medical conditions affecting growth was excluded.

The total sample size was estimated at 61 (lactating mothers with infants under 4 months old) based on the study's time constraints. Among the 61 participants, 23 were from Tilawa, 22 were from Ramnagar Anganwadi, and 16 were from Sainala Anganwadi.

All participants were enlisted from their respective Anganwadi centers before data collection. They were then contacted at their homes with the assistance of Anganwadi workers. Participants were informed about the study's objectives and methodology. Face-to-face interviews were conducted at their homes after obtaining informed consent for their convenience. The interviews were structured using a predesigned questionnaire to assess knowledge, attitude, and practices (KAP) regarding proper breastfeeding attachment and positioning. The questionnaire was divided into three segments: Sociodemographic details, antenatal KAP, and postnatal KAP. Participants were also asked to demonstrate breastfeeding techniques in front of the researchers. The following components of "good attachment" were assessed as per UNICEF guidelines for breastfeeding positioning.[14]

If any of the above points of the respective component were missed during the demonstration, that component was noted as the wrong technique. Immediately, participants were notified about their wrong techniques, and they were corrected by us along with playing videos of effective breastfeeding for easy learning. Along with playing the video, they were taught about the importance of exclusive breastfeeding and the good practices of effective breastfeeding (EBF). Simultaneously, their respective babies were weighed with the

Correct body position	Correct attachment	Correct suckling
Baby's head and body are in line	More areola is visible above your baby's mouth than below.	Slow sucks
Baby is held close to your body	Your baby's mouth is wide open.	Deep sucks
Baby's whole body is supported with your arm along their back	Their lower lip is turned out.	Sometimes pausing
Baby approaches breast nose to nipple,	Their chin is touching – or nearly touching – your breast	

help of a weighing machine. The current weight of babies was compared with their preferred weight as per their age in months on the WHO growth chart for boys and girls separately. All the mothers and their respective babies were followed up biweekly for 2 months after intervention.

In each visit, the same methods were repeated to correct the wrong technique patiently, and the weight of the respective babies was noted to measure the effectiveness of the intervention. In this process, four follow-ups were done. In each follow-up, all mothers who were corrected were contacted to encourage their good practices, and their babies were also weighed.

All the answers of participants for respective questions were entered into the Excel sheet on the same day of our visit. Data were analyzed using SPSS software version 20. By the descriptive method, the mean age of participants, the proportion of good practice among lactating women, the proportion of KA, and the mean weight of babies before and after intervention were calculated. Multilinear regression (mixed-effects regression) was applied to limit confounders to know the effectiveness of intervention by measuring the weight of babies.

Inclusion criteria

All lactating mothers with children under 4 months old in the selected urban areas were included in the study.

Exclusion criteria

Exclusion criteria were as follows: any female who had moved out of the study area during follow-up or whose child had congenital anomalies or medical conditions affecting growth was excluded from the study.

RESULTS

We analyzed the study in SPSS-20. The mean age of the study population was 25 years old. In this study, 61 participants participated. Out of 61 participants, two participants did EBF in our index visit. Eleven women among these participants dropped out for their personal

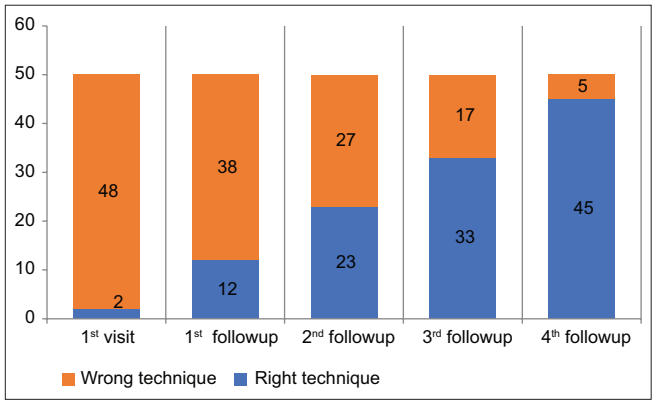


Figure 1: Progressive improvement in the practice of correct breastfeeding attachment technique was observed at each follow-up visit

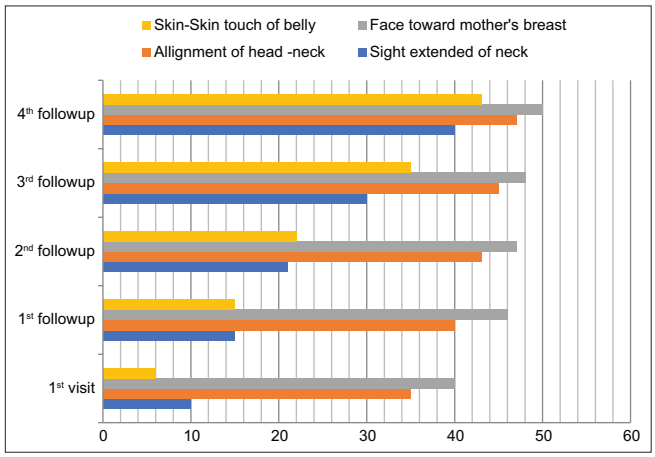


Figure 2: Improvement in each component of correct breastfeeding position observed at every follow-up visit

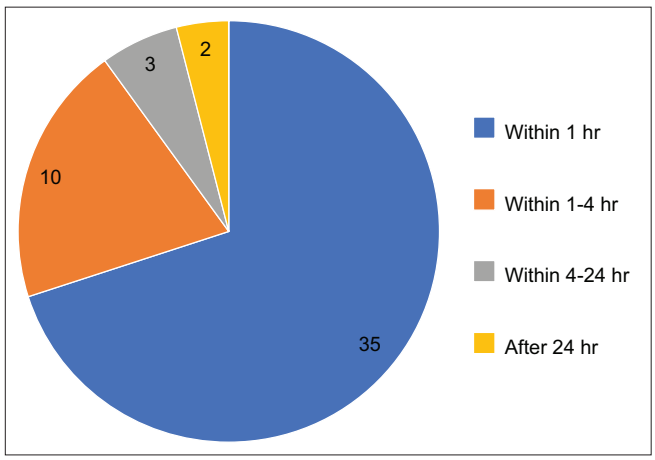


Figure 3: Time duration between birth and initiation of breastfeeding

issues. The rest of the 49 participants were intervened by knowledge and demonstration of videos of EBF. As per Figure 1, in the 1st follow-up, 10 participants could do EBF. Likewise, 11, 10, and 12 participants could do EBF in the respective 2nd, 3rd, and 4th follow-ups. Five participants could not be corrected, irrespective of intervention.

Twenty participants learned the breastfeeding technique from ASHA or Anganwadi workers during their antenatal check-ups, and two participants were aware of the breastfeeding method for nipple retraction.

Figure 2 illustrates that breastfeeding positioning indicators—skin-to-skin contact, face of baby towards breast, head-neck alignment, and neck extension—progressively improved across follow-up visits, demonstrating the effectiveness of repeated assessments and individualized support in promoting optimal breastfeeding technique.

Eighteen participants discarded colostrum due to certain myths and initiated feeding under local supervision. As per Figure 3, thirty-five participants initiated breastfeeding within the 1st h after delivery, whereas two participants were unaware of the exact time of breastfeeding initiation.

It was observed that poor breastfeeding practices gradually improved with each follow-up. These changes are documented in the following Table 1.

To assess effective breastfeeding, the weight of infants born to intervened mothers was measured at each follow-up and compared with the WHO growth chart separately for boys and girls.

Figure 4 shows among 28 boys, 26 achieved the expected weight gain, whereas two did not. As per Figure 5 among 22 girls, 19 attained the expected weight, whereas three did not, as per the WHO growth chart.

We applied a linear mixed-effects model using a fixed time interval as an independent variable. The outcome variable was the mean weight of the babies.

The factors analyzed included religion, mother's education, caste, assistance from the mother-in-law/relatives, and help from YouTube. Religion had no significant effect on the efficacy of effective breastfeeding.

Table 2 shows no significant difference in infant weight gain between Hindu and Christian mothers ($F = 2.74$, $P = 0.114$), suggesting religion alone doesn't strongly influence early growth.

Table 3 shows that infants of Christian mothers from Scheduled Caste backgrounds gained 4.3 g/week less than those of Hindu mothers from General backgrounds ($B = -4.30$; 95% CI –7.02 to –1.58; $P = 0.004$), highlighting the impact of intersecting sociocultural factors on early infant growth.

DISCUSSION

Exclusive breastfeeding is a safe, economical, and emotionally satisfying method of feeding babies, particularly in developing countries such as India and possibly others. In countries where lactation support is available, the prevalence of 6-month exclusive breastfeeding has gradually improved over time.[15]

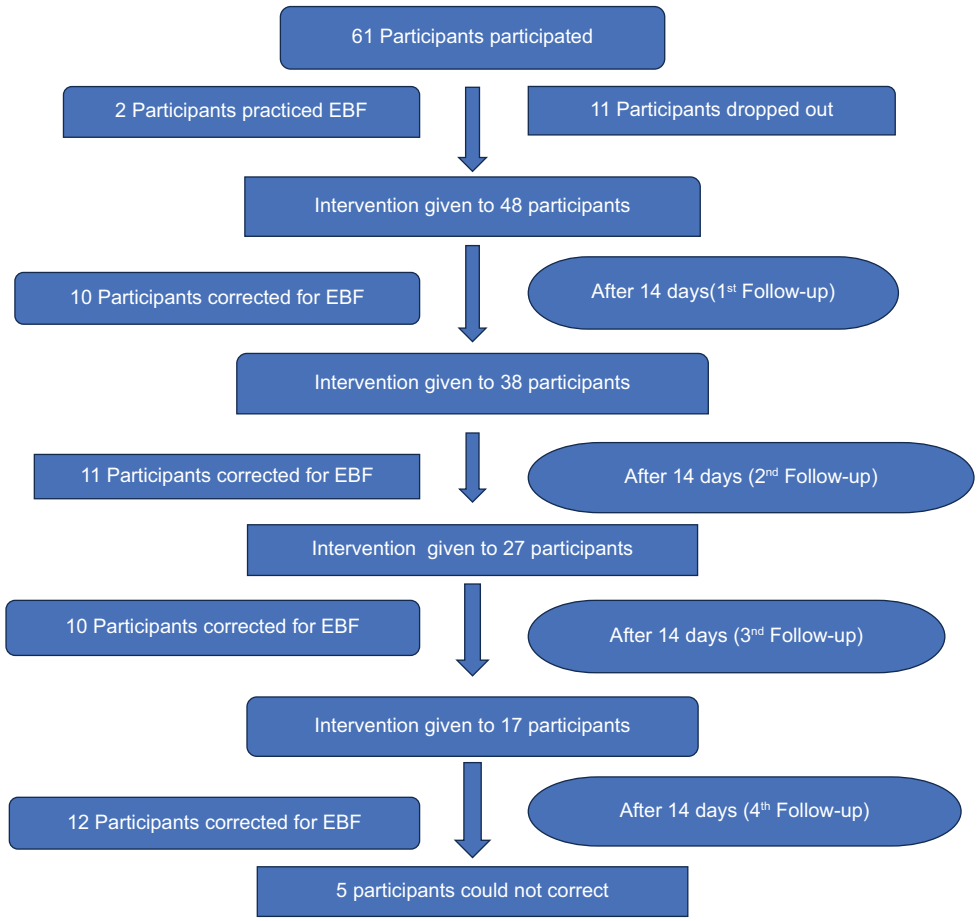
This study found that all mothers had initiated breastfeeding after delivery. According to the National Family Health Survey 5,[16] the prevalence of exclusive breastfeeding for 6 months was 59% in urban areas. However, in the three study areas within Jabalpur slums, the prevalence of exclusive breastfeeding up to 6 months and early initiation of breastfeeding was only 4%, which is significantly lower. These large differences might be due to the lack of exposure among slum-dwelling mothers to promotional messages and initiatives aimed at improving breastfeeding practices.

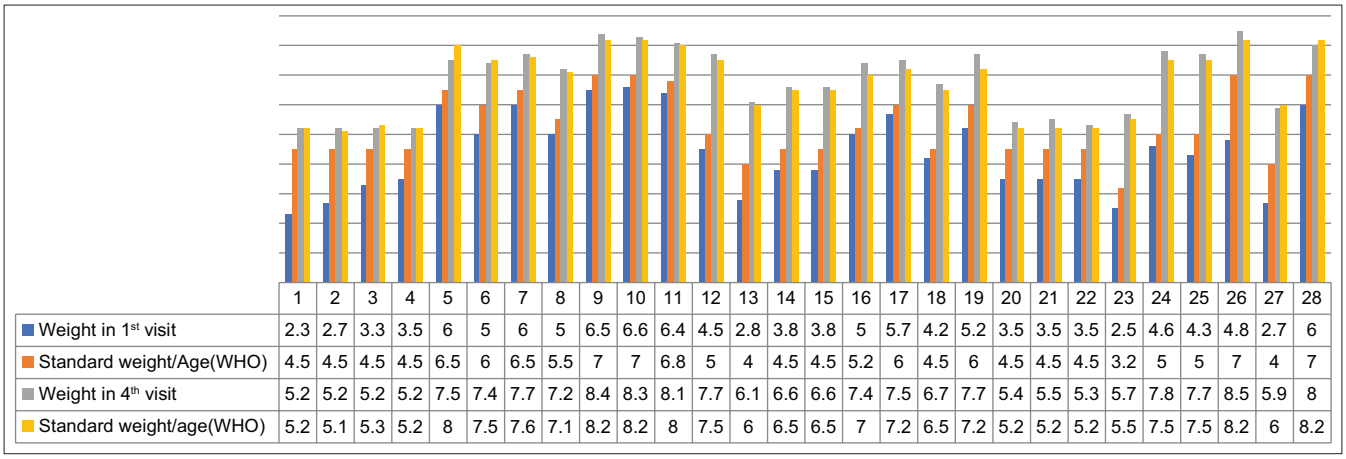
Exclusive breastfeeding rates could be improved by educating mothers on recognizing hunger cues, the importance of proper posture during breastfeeding, and the need to loosen inner garments before nursing. In our study, the majority of mothers recognized hunger cues solely as the baby crying, which affected the infant's ability to latch and suck effectively. Many mothers also complained of hand fatigue due to maintaining a monotonous posture. However, when a pillow was placed under their elbow to support the cradle position, they reported increased comfort, which led to longer breastfeeding sessions. Most mothers also adopted the practice of loosening their inner

Table 1: Improvement in good breastfeeding practices across follow-up visits

Changes in practice	Index visit	1st	2nd	3rd	4th follow-up
Hungry clues	18	27	41	45	50
Opening of inner garments before BF	8	15	31	38	42
Handwashing before BF	30	38	44	45	46
Offering alternate breast	30	35	40	45	50
>8 frequency of BF/Day	42	47	50	50	50
4 frequency of BF/Night	38	42	44	46	48
Feeding animal milk	18	14	10	8	5

BF: Breastfeeding





	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Weight in 1st visit	2.3	2.7	3.3	3.5	6	5	6	5	6.5	6.6	6.4	4.5	2.8	3.8	3.8	5	5.7	4.2	5.2	3.5	3.5	3.5	2.5	4.6	4.3	4.8	2.7	6
Standard weight/Age(WHO)	4.5	4.5	4.5	4.5	6.5	6	6.5	5.5	7	7	6.8	5	4	4.5	4.5	5.2	6	4.5	6	4.5	4.5	4.5	3.2	5	5	7	4	7
Weight in 4th visit	5.2	5.2	5.2	5.2	7.5	7.4	7.7	7.2	8.4	8.3	8.1	7.7	6.1	6.6	6.6	7.4	7.5	6.7	7.7	5.4	5.5	5.3	5.7	7.8	7.7	8.5	5.9	8
Standard weight/age(WHO)	5.2	5.1	5.3	5.2	8	7.5	7.6	7.1	8.2	8.2	8	7.5	6	6.5	6.5	7	7.2	6.5	7.2	5.2	5.2	5.2	5.5	7.5	7.5	8.2	6	8.2

Figure 4: Comparison of weight/age of boys with the standard weight/age of the World Health Organization before and after the intervention

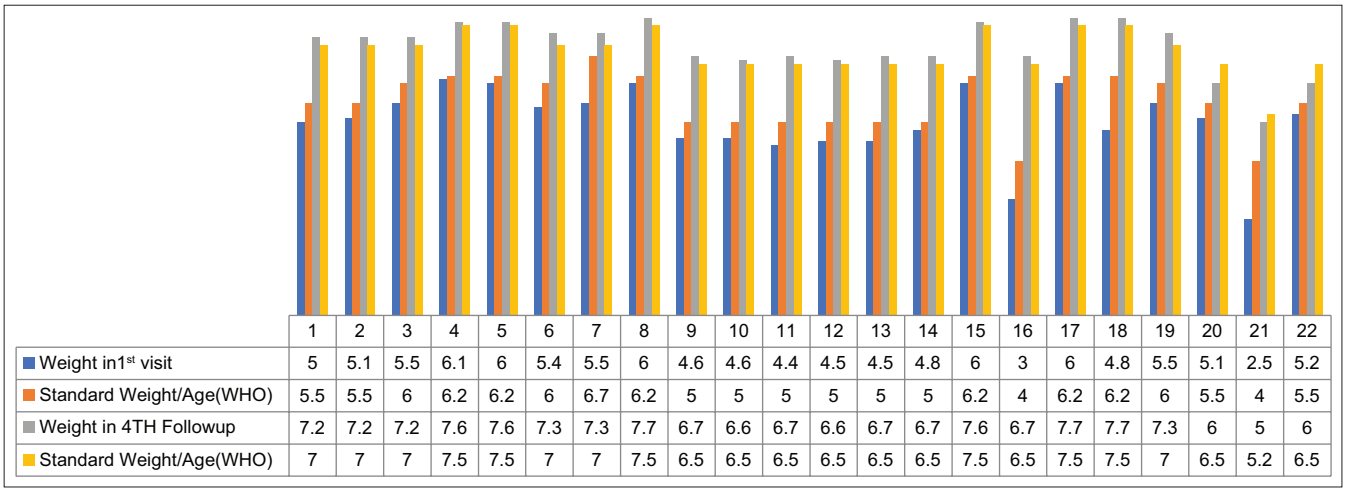
Table 2: Effect of maternal religion on infant weight gain

Fixed effect omnibus tests				
Variable	**F**	**Num df**	**Den df**	**P**
Religion	2.7354	1	19.929	0.114

Table 3: Effects of maternal religion and caste interaction on infant weight gain (0–4 Months)

Predictor	B	SE	95% CI	df	t	P
Christian × SC vs. Hindu × GN	–1.85	1.32	[–4.56, 0.86]	33	–1.40	0.170

B: Regression coefficients, SE: Standard Error, CI: Confidence interval, df: Degree of freedom, t: t test statistics, P: Probability.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Weight in1st visit	5	5.1	5.5	6.1	6	5.4	5.5	6	4.6	4.6	4.4	4.5	4.5	4.8	6	3	6	4.8	5.5	5.1	2.5	5.2
Standard Weight/Age(WHO)	5.5	5.5	6	6.2	6.2	6	6.7	6.2	5	5	5	5	5	5	6.2	4	6.2	6.2	6	5.5	4	5.5
Weight in 4TH Followup	7.2	7.2	7.2	7.6	7.6	7.3	7.3	7.7	6.7	6.6	6.7	6.6	6.7	6.7	7.6	6.7	7.7	7.7	7.3	6	5	6
Standard Weight/Age(WHO)	7	7	7	7.5	7.5	7	7	7.5	6.5	6.5	6.5	6.5	6.5	6.5	7.5	6.5	7.5	7.5	7	6.5	5.2	6.5

Figure 5: Comparison of weight/age of girls with the standard weight/age of the World Health Organization before and after the intervention

garments before breastfeeding, as tight clothing was found to obstruct milk flow, thereby reducing milk secretion.[17]

In addition, many mothers in the study were feeding their infants animal milk, which could trigger allergies and hinder growth. There is still a persistent myth regarding colostrum, leading 36% of women to discard it. Therefore, during antenatal check-ups, pregnant women should be educated about the importance of colostrum, recognizing hunger cues, and loosening inner garments before breastfeeding.

Despite our interventions, we could not correct breastfeeding practices for five infants (two boys and three girls), indicating the need for repeated interventions in urban slum areas. A study conducted in South India, within the catering zone of a rural health center in Tamil Nadu, showed that the population likely received multiple counseling sessions on breastfeeding best practices from CHWs. Previous studies have reported higher exclusive breastfeeding rates when breastfeeding is initiated within 6 h of birth.[18-20]

Mass media, including television and radio, did not appear to influence exclusive breastfeeding rates. However, parental education had a significant impact, whereas caste did not. A study conducted in Vellore, South India, found that the risk of early breastfeeding cessation was higher among educated mothers compared to those with no formal education.[21] We also explored the influence of social media on breastfeeding decisions and found that platforms like YouTube and Facebook had no impact on slum dwellers. Religion alone had no significant effect on breastfeeding ,but the religion-caste interaction showed lower weight gain in infants of Christian mothers from Scheduled Caste backgrounds .This highlights compounded sociocultural disadvantages. Goyal et al. (2011) similarly found that maternal background influences breastfeeding and infant outcomes.[22]

Limitations of the study

This study has several limitations that warrant consideration. First, the generalizability of findings may be limited due to the specific community context and voluntary participation, which may not reflect the broader population of breastfeeding mothers. Second, the relatively short follow-up period (up to four months of infant age) may not capture the longer-term impacts of breastfeeding practices on child growth and development. Lastly, despite efforts to adjust for potential confounding factors, the influence of unmeasured variables—such as maternal nutritional status, household food security, and underlying infections—cannot be entirely ruled out and may have affected growth outcomes.

CONCLUSION

Effective breastfeeding techniques and practices appear to significantly promote optimal child growth in our study population.

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PPN- Definition of intellectual content, literature survey, prepared the first draft of the manuscript, implementation of the study protocol, data collection, data analysis, manuscript preparation, and submission of the article; **AT-** Concept, design, clinical protocol, manuscript preparation, editing, and manuscript revision; design of the study, statistical analysis, and interpretation; **PG-** Review manuscript; review manuscript; literature survey and preparation of figures; and coordination and manuscript revision.

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