

ORIGINAL ARTICLE

Complementary Feeding Patterns and Factors Affecting Timely Introduction in a Tribal Population: A Mixed-Methods Study

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ABSTRACT

Introduction: About 29-60% of tribal children are underweight due to limited healthcare access. The Kols, a tribe in central India, face similar issues and our study will examine their complementary feeding practices. **Methodology:** A sequential explanatory mixed-method research design was conducted on 218 Kol tribe women in the Manikpur block of Chitrakoot district Uttar Pradesh. In the first phase, the quantitative interview using a semi-structured questionnaire and in the second phase, an in-depth interview of 20 Kol mothers was conducted using an interview guide. **Results:** About 52.3% of the women were aged between 26- 35 years, and about 83.9% were illiterate. About half of the children (n=116, 53.5%) were introduced to complementary feed at 6-8 months of age. The independent predictors of the timely initiation of complementary feeding were education (AOR: 2.422, p 0.037), age of the mothers (AOR: 1.2106, p 0.047) and the number of children of the mothers (AOR: 2.715 p 0.004) diet diversity was rarely maintained. **Conclusion:** Complementary feed was introduced timely for half of the tribal women but diet diversity was not maintained. Health education and counselling to utilize locally available food items should be encouraged.

KEYWORDS

Complementary Feed; Tribes; Mixed-Method Study; Diet Diversity

INTRODUCTION

The period of complementary feeding, which begins around six months of age, marks a crucial phase in an infant's development. During this period, nursing continues alongside the introduction of complementary foods to meet the expanding nutritional needs of the

growing Adequate and timely introduction of complementary feeding at six months while continuing breastfeeding is essential for growth and development of infants and is unmatched in later life stages. (1,2)

However, persistent undernutrition remains a prominent public health concern, particularly during the initial 1,000 days of life, when many

consequences are largely irreversible. Insufficient breastfeeding and inappropriate complementary feeding practices are primary contributors to undernutrition.(3,4) The gravity of the situation is evident from the National Family Health Survey of 2019-20, revealing a substantial 32.1% prevalence of underweight individuals in India.(5) Alarming statistics highlight that 45.9% of infants aged 6-8 months were introduced to solid or semi-solid foods while still being breastfed.(6) This issue is particularly exacerbated among tribal populations, constituting 8.6% of the total population according to the 2011 census. These tribes exhibit staggering prevalence rates of underweight children under the age of five, ranging from 29% to 69%.(7-12)

Marginalized tribal communities in India face poor health outcomes due to various factors such as isolation, inadequate healthcare infrastructure, poverty, and superstitious beliefs. This results in unmet medical needs and a scarcity of healthcare providers.

Focusing on the Kols, a tribal community residing in central India's regions such as Madhya Pradesh and the bordering areas of southern Uttar Pradesh, sheds light on the broader issues faced by tribal populations. Notably, the classification of the Kols differs between states, being recognized as Scheduled Tribes in Madhya Pradesh and Scheduled Castes in Uttar Pradesh.(13) To comprehensively explore the practices surrounding complementary feeding within the Kol tribe.

MATERIAL & METHODS

A sequential explanatory mixed-method research design was planned to obtain rich, in-depth information needed to understand and interpret the practices regarding complementary feeding practices. In the first phase quantitative data was collected and in the second in-depth interviews among lactating and expectant mothers of Kol tribe. The study was conducted over a period of 1 year in the Manikpur block of Chitrakoot district in Uttar Pradesh.

Based on a study that analyzed 69,464 responses from mothers in India who took part in the 2015-2016 National Family Health

Survey, the sample size was calculated. The results indicated that the frequency of introducing solid, semi-solid, or soft foods (referred to as complementary foods) to infants aged between 6 and 8 months across Central and Northern regions was 38%.(14) Using the formula, $n = Np(1-p)/(d^2)$; at confidence level of 80% and 5% margin of error(d), the estimated sample size was 155. Taking non-response rate of 20%, final sample size calculated was 206.

Thus, a total of 218 Kol mothers were interviewed regarding their complementary feeding practices. A total of 20 in-depth interviews were conducted. Case selection was done using random sampling. The operational definition of Timely initiation of complementary feeding was "It is the initiation of additional foods for a young children at sixth months of age along with continuing breastfeeding."(15).

Data Collection: The data collection was done by the researcher based on the semi-structured questionnaire and interview guide. First and foremost, a written informed consent was obtained. The researcher then briefed the participants about the project.

A face-to-face interviewer-initiated interview was conducted based on the quantitative questionnaire. Then, a semi-structured in-depth interview using an interview guide was conducted. All in-depth interviews were audio-recorded with the consent of the interviewee. These audio recordings were transcribed and translated from vernacular language to English, before being entered into QDA minor lite qualitative data analysis software for in-depth coding and analysis. Data collection and analysis was done concurrently as qualitative methods involve an iterative process.

Data Analysis: Quantitative data were entered into Microsoft Excel and were checked for completeness and analysed by Jamovi 2.3.28 software. The continuous data after categorisation and categorical data were expressed as percentages. The association between two categorical data was done using Chi-square test and between continuous using t-test or ANOVA depending upon the

categories. The significance of association was presumed at p value <0.05.

For the qualitative part, following data transcription, translation and entry into QDA minor lite software, the researcher will read and re-read transcripts several times. As categories and themes start to emerge, the researcher will engage in an inductive analysis by coding the data, identifying categories pertaining to the perceptions regarding breastfeeding, and analysing patterns and relationships between categories. A coding scheme emerged from the data as categories and subcategories were developed in an inductive fashion. Once a coding framework was finalized, it was reapplied to the data to test for consistency.

As mentioned previously, data collection and data analysis were conducted concurrently, and the interview guide was revised to draw upon emergent themes or area of enquiry.

Ethical Consideration: The project was started after obtaining ethical approval from the Institutional Ethical Committee (RMCHRC/ACADEMIC/Ph.D./1989B/04/08/20 22 dated 04.08.2022). Written informed consent was obtained from all participants before the interview begins. Participants were asked to agree to participate and for their interview to be recorded. Audio data and transcripts were stored on a password-protected computer which was accessible to the researcher. Any report, presentation or

publication resulting from this research did not have any information such as names that could identify research participants. Thus, the anonymity of the participants was maintained.

RESULTS

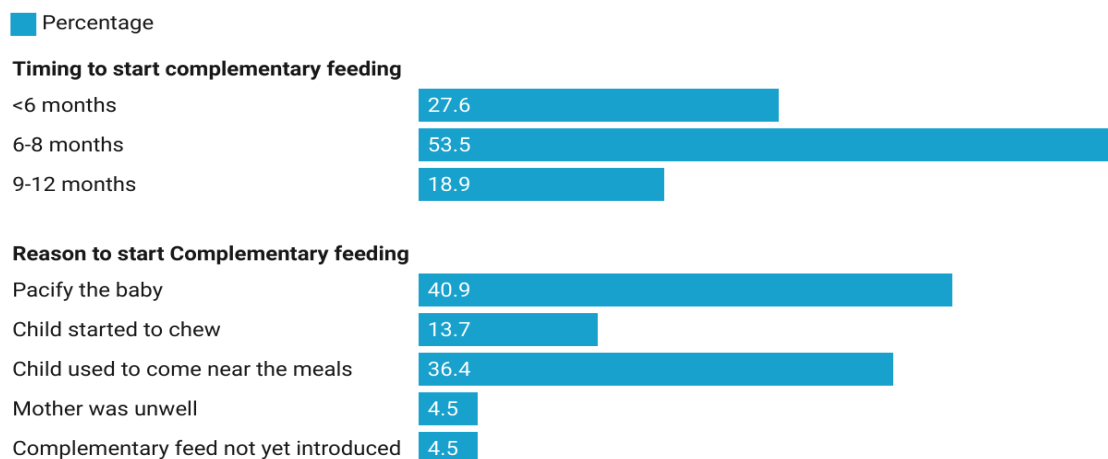
The current study was conducted to assess the complementary feeding practices among Kol tribe. The study comprised of reproductive-age women. More than half (52.3%) of the women were aged between 26- 35 years followed by 39.4% in the age group of 18-25 years. The mean age of the women was 27.5 (+/- 6.32) years. All the women were married.

Most of the women were homemakers (52.3%) followed by labourer (32.6%) and wood cutters (15.1%) by profession. More than four-fifth of the study participants were illiterate (83.9%) and only 16.1% claimed to be educated till primary school. Moreover, further enquiry found that the women who claimed to be educated were barely able to read, write and comprehend.

Timing of Complementary feeding:

About half of the children (n=116, 53.5%) were introduced complementary feed at 6-8 months of age. Next, for 27.6% of children, it was started before 6 months while approximately one-fifth of them (n= 41, 18.9%) started the complementary feeding between 6 to 12 months.

Figure 1: Distribution of study participants on the basis of timing of introduction of complementary feed and reason for the same



The independent predictors of the timely initiation of complementary feeding were education and age of the mothers and number of children of the mothers. It was observed that the odds of timely initiation were 2.4 times (p 0.037) and 1.4 times (p 0.004) significantly higher among Kol mother who were literate and had 3-5 number of children

against illiterate and 1-2 children respectively. With each unit increase in age at first pregnancy, the odds of timely initiation increased by 1.21 folds. Other insignificant factors were delivery at hospital (AOR: 1.3, p 0.475) and working mothers (AOR: 1.15, p 0.664).

Table 1: Predictors of timely initiation of complementary feeding among KOL tribal woman

Predictors	Adjusted Odds ratio	95% Confidence Interval		P-value	Odds ratio	95% Confidence Interval	
		Lower	Upper			Lower	Upper
Education of Mothers							
Primary – No formal education	2.4225	1.053	5.572	0.037	1.83	0.907	3.7
Place of delivery							
Hospital – Home	1.2858	0.645	2.563	0.475	1.13	0.632	2.01
Number of children							
3-5 – 1-2	2.7147	1.368	5.388	0.004	1.948	1.078	3.52
>5 – 1-2	1.0074	0.372	2.728	0.988	0.667	0.277	1.6
Age of mother at first child birth	1.2064	1.003	1.452	0.047	1.203	1.013	1.43
Occupation of mother							
Woodcutter/Labour-Homemaker	1.1477	0.617	2.135	0.664	0.968	0.563	1.66

Table 2: Theme, domains and codes of Complementary Feeding Practices among KOL tribals deduced from qualitative study

Theme	Domain	Codes
Complementary Feeding Practices	Food items in complementary feed	Biscuit Cow's milk Daal Light food Milk Rice Sabji
	Timing of initiation of complementary feed	1year 5months 6 months
	Reason for initiating complementary feed	Babies' requirement not met by breastmilk alone Baby started to come near food Satiety for 1-2 hours

Domain 1: Complementary Food items:

The variety of food items started as complementary food was biscuit, cow milk, milk, rice, daal and sabji. However, the most common item was biscuit.

Domain 2: Timing of initiation of complementary feed

The timing of initiation of complementary feed was 5- 6 months most commonly. Difference in introduction of complementary

feed varies in rural and urban area was also pointed out.

Verbatim: "Like someone start having solids at age of 5 months or 6 months, like small pieces of biscuits or like this."

"Biscuit, rice, daal."

"He is having milk, biscuit, since he was 6 months old. Now he is having everything like daal, chawal, roti."

Domain 3: Reason for initiating complementary feed

The reasons cited by the mothers on why they started the complementary feed at that particular time, two-fifth of the them (n=18, 40.9%) said they started the feed to pacify the baby, next 36.4% said that the child used to come near the food. Out of 44 mothers, 13 reported that since the baby started to chew the food, they introduced the feed. While in two cases, the mother was unwell to feed, so complementary feed was introduced.

The reasons cited for introduction of complementary feed was that breastmilk was not sufficient to meet the requirement of the babies. Those who worked in field told that they used to give light foods to the babies, so that the satiety is maintained for 1-2 hours while they are out for work.

Moreover, most common reason cited was that the babies started to crawl and come near the food. Thus, they started feeding them.

Verbatim: "When we used to sit for meal baby used to come closer so we used to put some eatable in baby's mouth too. This way he learnt too, stopped breastfeeding and started taking food."

"Baby use to cry when hungry. Stomach was not filled after having breastmilk so started giving milk and other eatables in small quantity."

DISCUSSION

The study focused on females who were of reproductive age and belonged to the KOL tribe. Amongst them, a significant majority (83.9%) lacked the ability to read and write, while only a small fraction possessed basic literacy skills. On average, they had three to five children and usually got married and started a family before reaching the age of 18. As per WHO recommendations, the complementary feeding should be initiated at 6th month with increasing quantity and quality of diet during 8-12 months.¹⁷ In the present study, about half of the mothers reportedly started the complementary feeding at 6 months. Nearly one-fifth of them started it after 8 months and about one-fourth before 6 months.

Wide variations have been reported in studies conducted among tribal population across the country. In coherence to the current study, marked inconsistencies are reported in initiation of complementary feeding, like early and delayed CF ranging from 3 to 6 months to even 12 months.^(3,15,16) A recent study examined 69,464 responses from mothers in India who participated in the 2015-2016 National Family Health Survey. The findings revealed a significant difference in the rate of introducing solid, semi-solid, or soft foods (known as complementary foods) to infants between 6 and 8 months old across different regions of India. The South region had the highest frequency at 61%, while the Central and Northern regions had the lowest at 38%.⁽¹⁷⁾

In comparison to the current study, the percentage of Garo mothers who started supplementing before six months was notably lower, at only 13%.⁽¹⁸⁾ However, the tribal community in Orissa followed exclusive breastfeeding for a year and only introduced additional foods after the child turned one.⁽¹⁹⁾ In a tribal region of Andhra Pradesh, 48.8% of infants received supplementary feeding before six months, while 16.3% received it after nine months.⁽²⁰⁾ These figures shed light on the need for better education and guidance for mothers to ensure that their children receive appropriate nutrition.

The current study also emphasizes the ignorance of the tribal women towards the importance of complementary feed. The complementary feed was started not with an intent to supplement the increasing demand of the growing child but only to pacify the child or because the child started chewing.

Additionally, the WHO-UNICEF Global Strategy for Infant and Young Child Feeding (GSIYCF) has recommended inclusion of four out of seven food groups to enhance the quality of complementary feeds for 6-23 months of children.⁽²¹⁾ It was noted that the 6 months old babies were started with biscuits precisely and a semi-solid grain-based diet was started later. Thus, the diet diversity was rarely achieved for majority of the children.

Verbatim: "Like someone start having solids at age of 5 months or 6 months, like small pieces of biscuits or like this."

"Biscuit, rice, daal."

"He is having milk, biscuit, since he was 6 months old. Now he is having everything like daal, chawal, roti."

Infant malnutrition can be effectively prevented by starting supplemental feeding at the age of six months. The children were given a combination of either rice and daal or rice and sabji. Thus, the recommended diverse food groups were rarely consumed by the tribals. A study conducted on the feeding habits of Santal mothers revealed that over half (53.3%) did not start complementary feeding on time, failed to offer the necessary meal frequency (58.5%), or did not provide sufficient dietary diversity (69.2%).(22) Meanwhile, a separate study conducted in rural North India showed higher rates of satisfaction, with only 6.9% of breastfed infants (aged 6 to 23 months) failing to meet the required meal frequency, and 10.7% of newborns aged 6 to 8 months not yet being exposed to solid or semi-solid foods.

A community- based study conducted among tribal population of Kerala reveals that the mean age of CF commencement was 4.5 months (SD +/- 2.8 months), and 62.7% of the 1150 randomly chosen tribal mother-infant pairs from five districts had CF at 6th month. It was further emphasized that parent's education, marital status, older ages at first pregnancies and children's age optimizes complementary feeding.(14,17)

Marathe S *et al*. conducted a cross-sectional study in three tribal districts of Maharashtra - Amravati, Gadchiroli, and Nandurbar. The study included 75 mothers with children aged 6 to 18 months. Top feeding was introduced to 15% of the children as early as 3-5 months, while the majority of children (65%) were started on top feeding between the ages of 6-7 months, which is the recommended age. Mothers' own attitudes, misconceptions, child sickness, child unwillingness to eat, and lack of knowledge regarding top feeding initiation were mostly associated with delayed top

feeding. The majority of children were initiated on top feeding with dal rice, while Soji, milk, and solid foods such as Poli and Bhakari were also used for first feeding.(23)

Two studies looked at the feeding practices of tribal communities in Andhra Pradesh. One found that mashed rice, ragi malt, cooked rice with vegetables, bala amrutham, and cerelac were all used as supplementary diets. Another study found that 76% of children received supplemental food, with rice/roti, bread and biscuits, and milk being the most popular choices. No commercial baby food was used.(24,25)

The recent study highlighted the importance of literate women starting complementary feeding in a timely manner. Furthermore, it was found that as age at first pregnancy increases, the likelihood of timely complementary feeding also increases. These results support previous studies that have shown that a mother's education, marriage, older age at first pregnancy, and the education level of the child's father all contribute to improved complementary feeding practices. On the other hand, working longer hours or being employed before pregnancy were found to have a negative impact on complementary feeding.(14)

In the southern part of the country, the situation for tribals was relatively better. The Kol tribe provided biscuits or khichdi with milk to their children, possibly due to the family's poor socio-economic status and their lack of knowledge about proper infant feeding practices. Some mothers worked as laborers and woodcutters, resulting in complementary feeding beginning before the recommended 6 months mark.

Strength of study

This study used a mixed-method approach across three tribal hamlets to gain insight into feeding practices. Both quantitative and qualitative data were collected, providing a comprehensive understanding of the community's beliefs and reasons behind these practices.

Limitations

Our exploration of the tribal community is ongoing. Building rapport takes time and resources, and some wood-cutting women were not available for interviews.

CONCLUSION

This study sheds light on the complementary feeding habits of tribal communities. Around half of the tribal women introduce complementary foods to their infants between 6 and 8 months of age, but they rarely offer a diverse variety of food groups, resulting in insufficient energy intake. Although the tribal population has access to abundant natural resources, they are largely unaware of their importance and benefits. It is crucial to educate them on the locally available food items that are indigenous and can fulfill the energy requirements of growing infants. This presents an opportunity for health promotion and education by field functionaries. Unfortunately, most tribals are not aware of government programs and policies that can uplift them, as they lack ration cards and Ayushman cards. Additionally, their health-seeking behavior is inadequate. It is crucial to educate parents on healthy child feeding habits and encourage them to maintain these practices.

AUTHORS CONTRIBUTION

SY: Conceptualization, methodology, software, investigation, resources, data curation, writing review and editing, visualisation, supervision, project administration; SA: Conceptualization, methodology, writing review and editing, visualisation, supervision, project administration; PL: software, formal analysis, writing original draft, writing review and editing AG: Conceptualization, methodology; AG: Conceptualization, methodology, supervision. The final manuscript is read and approved by all authors.

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Nil

CONFLICT OF INTEREST

There are no conflicts of interest.

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