Original article

A study on Infant Feeding practices among mothers of a Rural hilly area of District Dehradun

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Abstract:

Background: Optimal infant- and young child-feeding (IYCF) practices are crucial for nutritional status, growth, development, health, and ultimately the survival of infants and young children. **Practices like premature cessation of breastfeeding, early and unnecessary introduction of top feeding in incorrect dilutions and unhygienic pattern are also quite prevalent in many communities thereby aggravating malnutrition in children. The present study was undertaken to assess the feeding practices in the first six months among children less than three years, to know the barriers for the same and to study the effect of feeding practices on their nutritional status.** ***Methodology:*** A cross sectional study was conducted in **all the villages under Rural Health Training Centre, the field practice area of Department of Community Medicine. A total of 500 mothers with their underthree children were included in the study. A Predesigned pretested semi structured questionnaire was used to collect information on feeding practices within the first six months of life.** ***Results:*** In the present study a total of 160 (33%) children were on top milk of which majority consumed cow's milk and were fed by bottle (91%). Majority of the mothers diluted milk (87.5%) in the proportion of 1:1 (38%). In appropriate feeding practices were more common males. Infants who had inappropriate feeding practices in the initial six months were found to be maximally undernourished. ***Conclusion*****: The present study revealed suboptimal feeding practices in the first six months, which was again found as one of the major risk factor for malnutrition among children.**

Keywords: Feeding practices; IYCF; undernourished

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Introduction:

The right of child to be fed, nurtured and loved by the mother is the most ancient of all human rights recognized by all societies and cultures[1]. From the very first moments of life, a baby begins interacting with its mother. Mother is principal fostering figure for the child. Mother is the most important person in a baby's life for both its physical as well as its psychosocial care and growth. Thus, mother's health, her education, her beliefs and attitude regarding child rearing are important milestones on the road of child's health right from in utero period[2]. Her perceptions regarding feeding practices directly influence the health of the child.

As per WHO's recommendation breast milk alone is sufficient to meet the infant's nutritional requirements for the first 6 months of life[3]. In practice, however, foods other than breast milk are frequently fed to younger infants, sometimes being introduced within the first month of life[4]. The still strong oral suckle swallow and extrusion reflexes and immature tongue movements interfere with swallowing[5]. Faulty feeding introduces a source of contamination through feeding utensils and feeds while the infant's immune system is immature and dependent on the protective factors in breast milk, increasing the risks of diarrhea and other infectious diseases and undernutrition has been associated with early top feeding[6,7].

Unfortunately the prevalence and duration of breast feeding have declined in many parts due to a variety of social, economic and cultural practices. Because of advent of modernization, adoption of new life styles, lack of family support and advertisement, the importance attached to this traditional practice has been noticeably reduced in many societies[1]. Practices like premature cessation of breastfeeding, early and unnecessary introduction of top feeding in incorrect dilutions and unhygienic pattern are also quite prevalent in many communities. These practices are again influenced by socioeconomic, cultural and educational background of the child's

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Table 1: Sexwise distribution of children according to their Feeding practices

Variable	Distribution of children		Total	Z test	P value
Exclusive Breastfeeding	**Male**	**Female**			
Yes	14(58.33)	10(41.67)	24(5.13)	0.7524	>0.05
No	224(50.45)	220(49.55)	444(94.87)		
Total	**238(50.85)**	**230(49.15)**	**468**		
Top Milk					
Yes	87(54.38)	73(45.62)	160(33.61)	0.84	>0.05
No	159(50.32)	157(49.68)	316(66.39)		
Total	**246(51.68)**	**230(48.32)**	**476**		
Type of Animal Milk					
Cow Milk	74(54.41)	63(46.32)	136(85.0)	0.22	>0.05
Buffulo Milk	10(62.5)	6(37.5)	16(10.0)		
Both	2(50.0)	2(50.0)	4(2.5)		
Goat Milk	1(25.0)	3(75.0)	4(2.5)		
Total	**87(54.38)**	**73(45.62)**	**160**		
Mode of Feeding					
Bottle	80(53.74)	63(46.26)	143(89.37)	0.54	>0.05
Katori & Spoon	6(66.67)	3(33.33)	11(6.88)		
Glass	2(50.00)	2(50.00)	6(3.75)		
Total	**87(54.38)**	**73(45.62)**	**160**		
Dilute milk					
Yes	76(54.29)	64(45.71)	140(87.50)	**2.34**	**<0.05***
No	11(55.00)	9(45.00)	20(12.50)		
Total	**87(54.38)**	**73(45.62)**	**160**		
Proportion of dilution					
1:1	32(59.26)	22(40.74)	54(38.57)	**2.47**	**<0.05***
2:1	21(51.22)	20(48.78)	41(29.29)		
3:1	23(51.11)	22(48.89)	45(32.14)		
Total	**76(54.29)**	**64(45.71)**	**140(87.50)**		
Prefer IFF					
Yes	91(59.87)	61(40.13)	152(30.4)	2.64	**<0.05***
No	167(47.99)	181(52.01)	348(69.6)		
Total	258	242	500		
Preparation of IFF					
According to instructions	56(57.14)	42(42.85)	98(64.47)	1.22	>0.05
On own	35(64.81)	19(35.19)	54(35.53)		
Total	91	61	152		

**Figure in parenthesis indicates percentage

parents[2]. As far as literacy status of mother's is concerned, 41.20% of mothers were illiterate among the study population whereas maximum no of mothers (32.80%) were educated upto junior high school.

Moreover, Faulty habits arising from ignorance, superstitions and wrong beliefs are responsible for aggravating malnutrition in communities[8]

The displacement of breast milk by nutritionally inadequate complementary feeds and the potential damage to the immature gastrointestinal tract at this age hold serious consequences for the growth and health of the infant. Thus, appropriate feeding practice is an early investment towards the making of a healthy generation. In addition, Growth during 1st year of life is greater than at any other time after birth and good nutrition during this period of rapid growth is vital to ensure that the infant develops both physically and mentally to the fullest potential[9]. With this background in mind, the present study was undertaken to assess the feeding practices in the first six months among children aged less than three years and to study the effect of feeding practices on the nutritional status of under-three children.

Objectives:

a) To assess the status of infant and young child feeding practices in the

Table 2: Nutritional status of the children according to their Feeding practices

Variable	Distribution of children		Total	X^2	P value
	Well nourished	Undernourished			
Top Milk*					
Yes	54(33.75)	106(66.25)	160(33.61)	4.34	**P < 0.05***
No	138(43.67)	178(56.33)	316(66.39)		
Total	**192(40.34)**	**284(59.66)**	**476**		
Type of Animal Milk					
Cow Milk	58(42.37)	78(56.93)	136(85.0)	0.22	P > 0.05
Buffulo Milk	7(43.75)	9(56.25)	16(10.0)		
Both	1(25.0)	3(75.0)	4(2.5)		
Goat Milk	2(50)	2(50)	4(2.5)		
Total	**68(42.5)**	**92(57.5)**	**160**		
Mode of feeding					
Bottle	56(39.16)	87(60.84)	143(89.37)	$X^2 = 6.14$	**P < 0.05***
Katori & Spoon	8(72.73)	3(27.27)	11(6.88)		
Glass	4(66.67)	2(33.33)	6(3.75)		
Total	**68(42.5)**	**92(57.5)**	**160**		
Dilute milk					
Yes	57(40.71)	83(59.29)	140(87.50)	$X^2 = 1.46$	P > 0.05
No	11(55.00)	9(45.00)	20(12.50)		
Total	**68(42.5)**	**92(57.5)**	**160**		
Proportion of dilution					
1:1	10(18.52)	44(81.48)	54(38.57)	$X^2 = 18.0$	**P < 0.05***
2:1	22(53.66)	19(46.34)	41(29.29)		
3:1	25(55.56)	20(44.44)	45(32.14)		
Total	57(40.71)	83(59.29)	**140**		
Prefer IFF					
Yes	92(60.53)	60(39.47)	152(30.4)	$X^2 = 6.97$	P > 0.05
No	166(47.70)	182(52.30)	348(69.6)		
Total	**258(51.60)**	**242(48.40)**	**500**		
Preparation of IFF					
According to instructions	71(72.45)	27(27.55)	98(64.47)	$X^2 = 14.8$	**P < 0.05***
On own	21(38.89)	33(61.11)	54(35.53)		
Total	**92(60.53)**	**60(39.47)**	**152**		

Top Milk* = Animal milk **Figure in parenthesis indicates percentage

first six months.

b) To understand the barriers of infant feeding practices among mothers

c) To determine the relationship between feeding practices in the first six months and the nutritional status of infants and toddlers.

Methodology:

A community-based, cross-sectional descriptive study was conducted in Dehradun district of Uttarakhand among children aged less than three years. The study was conducted in the rural field practice area (RHTC) of Department of Community Medicine, HIMS, Dehradun from April 2009 to June 2010. Ethical approval for this study was obtained from the Institute's Ethical Committee. All the villages under the field practice area

Table 3: Association of Educational status of the mothers with their child's Feeding practices

Variable	Education of Mother				
	Illiterate	Upto JHS	Upto Intermediate	Graduate	Total
Exclusive Breastfeeding					
Yes	2(0.09)	3(1.83)	5(5.56)	14(35.00)	24(4.80)
No	204(99.03)	161(98.17)	85(94.44)	26(65.00)	476(95.20)
Total	**206**	**164**	**90**	**40**	**500**
Top Milk					
Yes	49(26.06)	60(37.04)	36(40.91)	15(39.47)	160(33.61)
No	139(73.94)	102(62.96)	52(59.09)	23(60.53)	316(66.39)
Total	**188**	**162**	**88**	**38**	**476**
Type					
Cow Milk	40(81.63)	52(86.67)	32(88.89)	12(80.00)	136(85.00)
Buffulo Milk	5(10.20)	5(8.33)	3(8.33)	3(20.00)	16(10.00)
Both	2(4.08)	2(3.33)	0(0.00)	0(0.00)	4(2.50)
Goat Milk	2(4.08)	1(1.67)	1(2.78)	0(0.00)	4(2.50)
Total	**49**	**60**	**36**	**15**	**160**
Mode of feeding					
Bottle	47(95.92)	57(95.00)	29(80.56)	10(66.67)	143(89.37)
Katori& Spoon	1(2.04)	2(3.33)	5(13.89)	3(20.00)	11(6.88)
Glass	1(2.04)	1(1.67)	2(5.55)	2(13.33)	6(3.75)
Total	**49**	**60**	**36**	**15**	**160**
Dilute milk					
Yes	46(93.88)	54(90.0)	31(86.11)	9(60.0)	140(87.50)
No	3(6.12)	6(10.0)	5(13.89)	6(30.0)	20(12.50)
Total	**49**	**60**	**36**	**15**	**160**
Proportion of dilution					
1:1	21(52.50)	21(38.89)	10(30.31)	2(15.38)	54(38.57)
2:1	10(25.00)	17(31.48)	11(33.33)	3(23.08)	41(29.29)
3:1	9(22.50)	16(29.63)	12(36.36)	8(61.54)	45(32.14)
Total	**40**	**54**	**33**	**13**	**140(87.50)**
Prefer IFF					
Yes	43(20.87)	49(29.88)	38(42.22)	22(55.00)	152(30.4)
No	163(79.13)	115(70.12)	52(57.78)	18(45.00)	348(69.6)
Total	**206**	**164**	**90**	**40**	**500**
Preparation of IFF					
According to instructions	22(51.16)	29(59.18)	28(73.68)	17(77.27)	98(64.47)
On own	21(48.84)	20(40.82)	10(26.32)	5(22.73)	54(35.53)
Total	**43**	**49**	**38**	**22**	**152**

(RHTC) of Department of Community Medicine were included in the study. A list of households having children less than three years of age from all the villages under RHTC was prepared and a total of 789 under three children were enlisted in all the eight villages.The estimated sample size was calculated according to the formula: $N=4pq/d^2$ where p is the prevalence of malnutrition, q=1-p, and d is the allowable error. Taking the prevalence of malnutrition in children under three

Education status of the Mothers

Variable	Sex Composition		Total (N=500)
	Male(n=258)	Female(n=242)	
Mother's Education			
Illiterate	102(49.51)	104(50.49)	206(41.20)
Upto Junior High School	83(50.61)	81(49.39)	164(32.80)
High School-Intermediate	46(51.11)	44(48.89)	90(18.00)
Graduate & above	27(67.50)	13(32.50)	40(8.00)

years of age as p=45.9%[10] and allowable error d as 10% of p, the sample size was calculated to be 468. Considering a non response rate of 5% it was estimated to be 491 and hence the sample size was rounded off to 500 children. **A door-to-door survey was conducted and households with at least one infant below three years were selected. Taking the inclusion/exclusion criteria into account i.e. infants of multiple births defects, children who were absent for at least three consecutive visits, parents who did not gave consent, or the child was uncooperative during clinical examination or while taking anthropometry, incomplete questionnaire, families with more than one child, in 0-3 years age n group, only the younger child was selected for the present study. Hence, a total of 500 children were covered from these eight villages. Verbal informed consent was obtained from each of the mother and they were reassured that the information obtained will be confidential and used only for the purpose of this study.** Since many women were expected to be illiterate the interview method was preferred over self administered questionnaire method. A semi-structured questionnaire was designed and all the questions were framed keeping the study objectives in mind. The questionnaire was tested with the pilot study of 50 mothers of the same area who had children less than three yrs of age. A team of medical interns and researcher herself collected information and feeding practices of the study children by interviewing mothers/other responsible caregivers at their home using a pre-designed and pre-tested semi structured proforma. To keep a check on the validity of the data, 10% of it was cross checked. Whole process of data collection was monitored by independent observers and supervised by the investigator. The terms and definitions for Infant and Young Child Feeding (IYCF) Practices were according to National Guidelines on IYCF, 2nd edition (2006) and Integrated Management of Neonatal & Childhood Illness[11,12]. Nutritional status of the child was assessed with the help of anthropometric measurements. The New World Health Organization standards were utilized for classification of children in various grades of nutritional status[13].**The data analysis was carried out using a statistical package, Epi info version 6.0. The differences in the feeding practices between nutritional status and sexes and if any, were calculated using chi-square test and z test. In all statistical analysis only $p < 0.05$ were considered significant.**

Results:

In the present study a total of 160 (33%) children were on top milk of which majority consumed cow's milk & were fed by bottle (91%). Majority of the mothers diluted milk (87.5%) in the proportion of 1:1 (38%).Almost 30% babies were on Infant feeding formula in the initial six months of which 35% were not preparing it as per instructions (Figure 1). Inappropriate feeding practices was more common males (Figure 2) and was found to be significant in case of intake of top milk, diluted milk and over dilution of milk (Table 1).

Infants who had inappropriate feeding practices in the initial six months were found to be maximally undernourished and was found to be significant in case of top milk, bottle feeding, consumption of over diluted milk, formula milk intake (Table 2).

It was further noted that mother with higher educational status had better feeding practices as compared to illiterate mothers i.e. Exclusive breastfeeding, lesser of bottle feeding, lesser dilution of milk & preparation of Infant feeding formula(IFF) as per instructions(Table 3).

Discussion:

The finding that breastfeeding was virtually universal (93.6%) among our study sample confirm that it is not the failure to breastfeed, but rather the failure to exclusively breastfeed and the feeds given in addition to breastmilk, that are causes for concern. Our findings are comparable to studies by Kumar[14] and Rasania[15]et al where, 93.40% and 92.37% infants were provided with breast milk as the first food intake. Exclusive breastfeeding till 6 months was just 5.20% in our study, whereas it was slightly higher i.e. 9.70% in NFHS-3 India[16] and 7.20% according to NFHS-3Uttarakhand[17]. It is likely that studies which do not probe for

the feeding of water to young infants may over-report exclusive breastfeeding rates. It was further observed in our study, that children who were not exclusively breastfed were found to be more undernourished i.e. 61.94% as compared to those who were exclusively breastfed i.e. 16.67%, Similar findings were quoted by Khokhar et al[18] where majority i.e. 64.80% of children who were not exclusively breastfed children were found to be undernourished. Traditional beliefs and practices, besides lack of knowledge regarding current feeding recommendations, might also play a part. Giving water and 'milk other than breast milk' to breastfed babies were the limiting factors for exclusive breastfeeding. Malnutrition was observed less in children who were on exclusive breast feeding till 6 months. Economic changes affect infant feeding also as the increasing demand for hilly women to work outside the home has been shown to decrease the duration of exclusive breastfeeding and to expedite the early introduction of complementary foods.

Top milk was given to 33% of children in the present study. It was further seen that children in whom top milk was given before 6 months of age were more undernourished (66.25%) than their counterparts(56.33%).The commonest reasons for starting top feeds was not enough milk, as percieved by 43% mothers in the present study, similar to other studies significant number of mothers i.e. 51 (25.5%) used formula milk. Though living in rural areas it was mostly because of relative as well as health worker's advice, ignorance of mother and lack of efforts by health workers, maternal and infant illness and subsequent pregnancy. Introduction of early top feeds with a wrong notion of inadequate milk appears to be most detrimental to exclusive breastfeeding. If top feeds are given, there is less sucking leading to less secretion of milk and lactation failure. In the event of maternal and infant illness, introduction of top feeds further reduce breast milk production. On questioning how mothers assessed adequacy of breastfeeds, none of them gave the reasons as poor weight gain and passage of inadequate amount of urine (two reliable signs of inadequacy of breastfeeds). On the contrary, they revealed some subjective signs which were interpreted to mean that milk was inadequate *e.g.* baby was not satisfied with feeds, cries often, wants frequent feeds or bites on the nipple. Introduction of early top feeds with a wrong notion of inadequate milk appears to be most detrimental to exclusive breastfeeding.

Bottle feeding has infiltrated quite widely into the villages and even commercial milk formula and are used by many mothers. Most of the mothers gave cow's milk to the babies i.e. 85% during the first six months &majority of them gave milk using bottle(89.37%) rather than glass or cup with spoon .Similar findings were seen from another study by Bhandari [2]et al where cow's milk was the most frequent type of milk used for top feeding (63%) . A few mothers cited household work and convenience of mothers as reasons for bottle feed the child specially at night. This indirectly is detrimental to infant's health. It was further seen that bottle feeding and over dilution of milk was a significant risk factor to child's nutritional status. Lack of awareness regarding correct feeding practices was the main cause for adoption of such a practice which may result in baby's dental decay by milk remaining in contact with the teeth during sleep. The proportion of bottle-feeding in the present study was higher as compared to a study by Wamani[19]et al and Pandey[20] et al. from rural West Bengal. The results of this study demonstrated that a negative practice (bottle use) is strongly associated with higher rate of undernutrition. This is an undesirable trend specially considering the fact that in the rural set up, majority of the mothers do not boil the bottle regularly or boil it only sometimes.

Majority of the mothers (87.5%) diluted the milk mainly because they believed that this facilitated digestions. Feeding diluted milk to children, is a norm in this region, was found to have significant association with undernourishment. Over dilution of milk (38.57%) was yet another practice followed by majority of mothers. Further, of the 140 mothers who started the babies on animal milk (cow, goat and buffalo), majority **54 (38.7%) gave diluted milk in 1:1 proportion.** A study by Kumar et al[21] also suggests that majority of mothers in his study also diluted the milk feed excessively whereas in another study by Bhandari [2]et al majority (1/3rd) of the babies received milk in diluted form. In another study at Karnataka, by Basi[22] et al, consumption of diluted milk was associated with an increased risk of undernutrition. Mothers need to know hygienic methods (including bottle hygiene) of giving artifical or animal milk wherever necessary and giving undiluted milk if top feeds are required. These observations further highlight the critical role of ignorance of mothers and lack of efforts to educate them in existing health delivery system.

Regarding formula feeds, it is discouraging to note that almost one third of the mothers i.e 30% reported giving formula feeds to the babies and 35% of them did not know exact preparation of formula feeds resulting in over diluted preparation resulting in inadequate energy intake and higher rates of undernutrition. This is higher than that reported by Manandhar[23] et al where only 16% of the mothers formula feeds to their children and in another study by MacIntyre [24] et al where 82% of the mothers knew the correct preparation of formula feeds. This could be reflective of the working status of mothers who were primarily labourer by occupation in our study and their need to return back to work, also there was lesser awareness among mothers of hilly region. The reasons seem to be urbanization, advertisement etc. Long-held infant feeding beliefs and practices of many populations are beginning to change. As people migrate to and from urban centers, and as information becomes more available and accessible via computers and other mediums, ideas are exchanged between people from all over the world. In India, the western ideas of formula feeding and alternative breast milk options are becoming more and more widespread. Use of formula feeds was more i.e. 60% among males and the same was found to be statistically significant.

Limitation:

Our study was cross sectional and hence certain biases arise. Information regarding the feeding practices in the first six months by the mothers could have been subject to recall bias. Our study has limitation of being representative of only the rural area and hence could not be generalized for the entire hilly population of the region. Further in depth studies are needed to explore the infant feeding practices in hilly regions of other parts of India.

Conclusion:

In conclusion, while our study confirmed that breastfeeding was practiced almost universally among the study population, it also showed that addition of feeds other than breast milk within the first six months was commonly practiced. The other findings suggest that bottle feeding has infiltrated quite widely into the villages and even commercial milk formula is used by many mothers. It is mandatory that mothers should be educated during their antenatal period regarding undisputed beneficial effects of exclusive breastfeeding and further wrong notions regarding insufficient milk should be overcome by mass media. The association of malnutrition to inappropriate infant and young child feeding practice is further confirmed in our study. To reduce childhood malnutrition due emphasis should be given in improving the knowledge and practice of parents on appropriate infant and young child feeding practices.

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