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Comparison of complementary feeding practices among urban and rural mothers – A cross sectional study

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Abstract: *Introduction:* Exclusive breast feeding till 6 months of age, followed by nutritionally rich complementary feeding is the WHO recommended appropriate infant feeding practice. This study was conducted to compare complementary feeding practices of urban and rural mothers and to understand factors influencing these practices. *Methodology:* Community based cross-sectional study was done at urban and rural field practice areas of Department of Community Medicine, J. N. M. C., Belgaum. By random sampling, 380 rural and 400 urban mothers having one year old child were selected. Information on socio-demographic variables, complementary feeding practices was recorded. *Results:* Only 65 (16.25%) urban and 58 (15.26%) rural mothers had practiced exclusive breast feeding till 6 months of age. Complementary feeds were initiated by 69.20% urban mothers before the infant was 6 months old and 42.11% rural mothers had initiated at recommended 6 months. Types of foods given were inappropriate and the amount and frequency of feeding were inadequate. Educational status of the mothers, socio-economic status of the mothers and the place of delivery had significant association with age at initiation of complementary feeding ($p<0.05$). *Conclusion:* Present study revealed inappropriateness in complementary feeding practices in terms of age at initiation, type of food given as well as amount and frequency. However, practices of urban mothers were better than that of rural mothers.

Keywords: Exclusive breast feeding, Minimum Acceptable Diet, Weaning foods.

Introduction

Tomorrow's nation marches on today's tiny feet. Alas, many of these cute little ones do not reach adulthood or if they do they are unhealthy because of childhood malnutrition. Malnutrition is one of the biggest killers of our nation. If it does not take its toll, then it leaves long term morbidities. As per national family health survey, percentage of children stunted, wasted and underweight are as high as 44.9%, 22.9% and 40.4% respectively [1]. Majority of malnourished children are so because of faulty feeding practices of their mothers or other care givers. Malnutrition begins mostly in infancy at the time of weaning because complementary feeds are started too early or too late and are most often nutritionally inadequate and unhygienic. Optimum age for beginning the complementary feeding is at 6 months. Breast milk cannot meet the nutritional need of the infant after 6 months of age and the infants are also developmentally ready for foods other than breast milk. Premature initiation of complementary feeds before 6 months of age can also cause malnutrition as the gastro-intestinal system is not yet ready to assimilate complex foods leading to insufficient nutrients and energy reaching the body systems. Hence, it is important to begin complementary feeding at the appropriate age of 6 months. Food needs to be undiluted and balanced with all the three proximate principles and micronutrients in order to meet the nutritional requirement of the growing infant. Unhygienic preparation of food predisposes the child to infections perpetuating malnutrition.

World Health Organization has given the guiding principles of complementary feeding which are as follows – exclusive breast feeding till 6 months of age, introduction of complementary feeds at 6 months of age with continued breast feeding till 2 years of age, hygienic and proper food handling, start with small amount of foods and increase the quantity, consistency and frequency of feeding gradually, feed variety of nutrient rich

foods and increase food intake during illness with soft, easily digestible foods [2]. Mothers need to practice appropriate complementary feeding in order to provide adequate nutrition to the child to make it healthy and well nourished. Appropriateness of any practice depends on the adequacy of the mothers' knowledge, which in turn depends on the mother's education, her socio-economic status, her access to information regarding complementary feeding, feeding taboos and so on. Rural mothers are generally not well educated; have poorer socio-economic status and difficulty in accessing information regarding breast feeding as compared to their urban counter parts. Hence, this study was taken up to compare the complementary feeding practices keeping in mind the WHO guiding principles and the factors influencing these practices in the urban and rural areas.

Material and Methods

A one year long cross sectional study was carried out from January to December 2011 in urban field practice area under Urban Health Centre, Khasbag and rural field practice areas namely Vantamuri, Kakati (A and B), Honaga and Bhutramanahatti under Primary Health Centre, Vantamuri. There were 17 villages under Primary Health Centre, Vantamuri. Among these, by using simple random sample method, above named 5 villages were chosen. The urban and rural areas where the study was conducted, were the field practice areas of J. N. Medical College, Belgaum.

Multi indicator coverage survey conducted jointly by UNICEF and Government of Maharashtra in all districts of the state showed that the prevalence of exclusive breast feeding in urban area was 49.00% and in rural area was 37.00% [3]. Absolute error of 5.00% was considered and by using the formula $n = 4pq/d^2$, sample size was worked out as 400 in urban and 380 in rural areas. Mothers in the above mentioned study areas having child aged one year were included in this study.

In urban area, information regarding the births between January to December 2010 were collected in January 2011 from 39 Anganwadis. There were a total of 664 mothers having a 1 year old child. By simple random sample method, using random number tables, 400 mothers were selected. They were interviewed in the month in which their infants completed one year in order to minimize recall bias regarding complementary feeding practices.

In the rural area information regarding the births between January to December 2010 were collected in January 2011 from the birth registers of the sub centers of the above mentioned villages. There were 679 mothers, out of which 380 mothers were selected using random number table. They were also interviewed in the month in which their infants completed one year. Residential addresses of these mothers were collected from anganwadi workers in urban and female health worker of the sub-centers in rural areas. Mothers were interviewed using a pre-designed, pre-tested questionnaire regarding socio-demographic factors and infant feeding practices inclusive of breast feeding and complementary feeding. If the mothers were not present at the time of visit, they were revisited for a maximum of three times. Despite three visits if they were unavailable then next number in the random number table was chosen.

The present study was approved by J. N. M. C. Institutional Ethics Committee on Human subjects' research. Analysis was done by rates, means and Chi square test using SPSS version 18.0 software.

Results

A majority of 260 (65.00%) urban as well as 244 (64.21%) rural mothers were in the age group of 20 to 24 years with a mean age of 23.45 ± 2.34 years in urban and 23.20 ± 2.64 years in rural area. Among the study participants, as many as 331 (82.75%) urban and 322 (84.74%) rural mothers were Hindus. Literates were more among urban participants with 361 (90.25%) urban and 296 (77.89%) rural mothers being literates. Whereas, employment status was better in rural area with 44 (11.58%) rural mothers being employed in various jobs as opposed to 23 (5.75%) urban mothers.

In the urban area, 130 (32.50%) mothers belonged to the families with per capita income less than Rs. 950/- compared to 155 (40.79%) rural mothers. None of the urban

participants had delivered at home; whereas, 32 (8.42%) rural mothers had done so. *(Table I)* Among those who had delivered at a hospital, as many as 370 (92.50%) urban and 294 (84.48%) rural mothers were told about the benefits of breast feeding in the hospital ($\chi 2$=27.327, DF=1, p<0.001).

Table-1: Distribution of study participants according to socio-demographic variables

Socio-demographic variables	Urban (%) N=400	Rural (%) N=380
Age (years)		
<19	22 (5.50)	20 (5.26)
20- 24	260 (65.00)	244 (64.21)
≥ 25	118 (29.50)	116 (30.53)
Religion		
Hindu	331 (82.75)	322 (84.74)
Muslim	69 (17.25)	56 (14.74)
Christian	0 (0.00)	2 (0.52)
Literacy status		
Illiterate	39 (9.75)	84 (22.11)
Literate	361 (90.25)	296 (77.89)
Occupational status		
Housewife	377 (94.20)	336 (88.42)
Working	23 (5.80)	44 (11.58)
Socio-economic status		
APL	270 (67.50)	225 (59.21)
BPL	130 (32.50)	155 (40.79)
Place of delivery		
Hospital	400 (100.00)	348 (91.58%)
Home	0 (0.00)	32 (8.42%)

Unfortunately only 65 (16.25%) urban and 58 (15.26%) rural mothers had practiced exclusive breast feeding till 6 months of age *(Table II)*.

Table-2: Distribution of study participants according to type of breast feeding and age at initiation of complementary feeding

	Urban (%) N=400	Rural (%) N=380	
Type of breast feeding till 6 months of age			
Exclusive	65 (16.25)	58 (15.26)	$\chi 2$=0.17,
Predominant	309 (77.25)	296 (77.89)	DF=2,
Partial	20 (5.00)	26 (6.85)	p=0.921
Token	6 (1.50)	0 (0.00)	
Age at initiation of complementary feeding			
< 6 months	277(69.20)	90 (23.68)	$\chi 2$=210.12,
At 6 months	115 (28.80)	160 (42.11)	DF=2,
> 6 months	8 (2.00)	130 (34.21)	P<0.001

Table-3: Distribution of study participants according to complementary foods						
	6 – 8 months of age			9 – 12 months of age		
	Urban (%) N = 400	Rural (%) N = 380		Urban (%) N = 400	Rural (%) N = 380	
FOR MEALS						
Type						
None	10 (2.50)	118 (31.05)	$\chi 2$=45.62	0 (0.00)	26 (6.84)	$\chi 2$=131.25
Cereal based	133 (33.25)	142 (37.36)	DF=5	62 (15.50)	174 (45.79)	DF=5
Double mix	30 (7.50)	32 (8.43)	p<0.001	50 (12.50)	56 (14.74)	p<0.001
Triple mix	28 (7.00)	10 (2.63)		55 (13.75)	30 (7.89)	
Quadruple mix	6 (1.50)	6 (1.57)		2 (0.50)	2 (0.53)	
Commercial foods	41 (10.25)	26 (6.84)		14 (3.50)	20 (5.26)	
Combination of foods	152 (38.00)	46 (12.12)		217 (54.25)	72 (18.95)	
Frequency per day						
Not applicable	10 (2.50)	118 (31.06)	$\chi 2$=144.3	0 (0.00)	26 (6.84)	$\chi 2$=50.9
1	10 (2.50)	38 (10.00)	DF=3	4 (1.00)	42 (11.06)	DF=3
2	332 (83.00)	182 (47.89)	p<0.001	140 (35.00)	150 (39.47)	p<0.001
3	48 (12.00)	42 (11.05)		242 (60.50)	156 (41.05)	
4	-			14 (3.50)	6 (1.58)	
FOR SNACKS						
Foods given						
None	6 (1.50)	124 (32.63)	$\chi 2$=31.800	0 (0.00)	48 (12.63)	$\chi 2$=99.281
Biscuits only	258 (64.50)	196 (51.58)	DF=3	262 (65.50)	258 (67.89)	DF=3
Fruits only	4 (1.00)	16 (4.21)	p<0.001	4 (1.00)	24 (6.32)	p<0.001
Various combinations	132 (33.00)	44 (11.58)		134 (33.50)	50 (13.15)	
Frequency per day						
Not applicable	6 (1.50)	124 (32.63)	$\chi 2$=160.2	0 (0.00)	48 (12.63)	$\chi 2$=40.94
1	14 (3.50)	42 (11.05)	DF=2	12 (3.00)	57 (15.00)	DF=2
2	322 (80.50)	180 (47.37)	p<0.001	306 (76.50)	211 (55.53)	p<0.001
3	58 (14.50)	34 (8.95)		82 (20.50)	64 (16.84)	

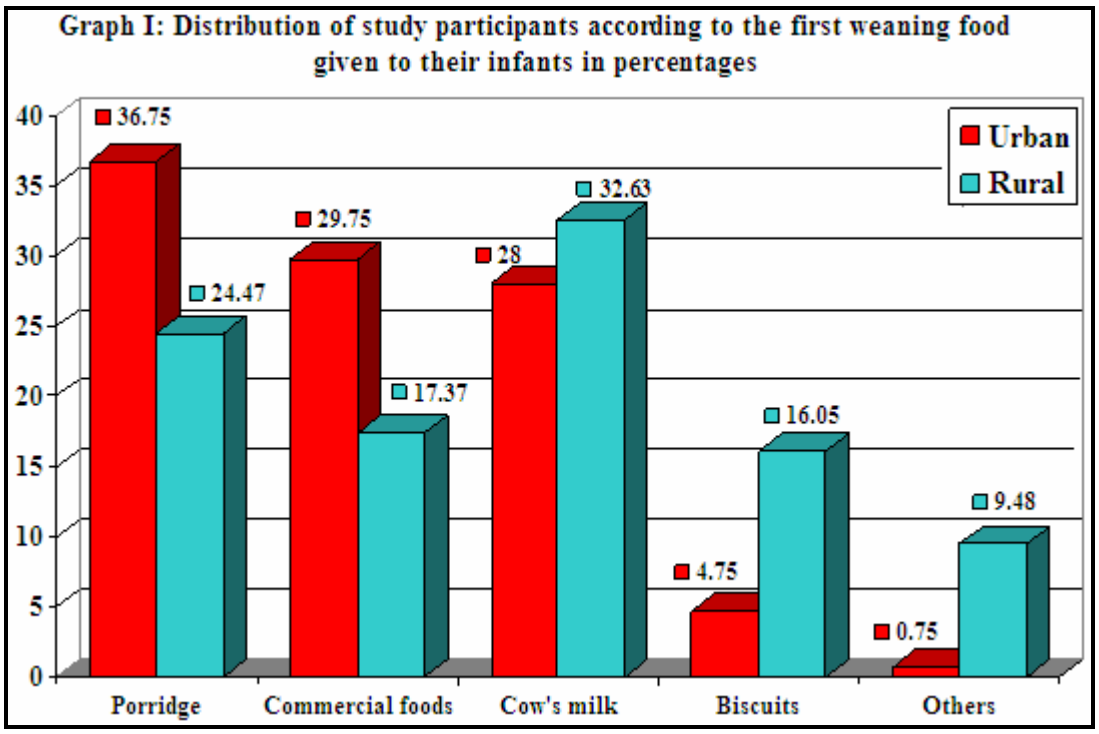
Complementary feeds were initiated by as many as 277 (69.20%) urban mothers before the infant was 6 months old. Whereas, rural mothers were better in this aspect as a majority of 160 (42.11%) mothers had initiated complementary feeds at recommended appropriate age of 6 months. Nevertheless, considerably large number of 130 (34.21%) rural mothers had delayed the initiation of complementary feeding to beyond 6 months of age *(Table II).*

Several reasons were quoted by the mothers for premature initiation of complementary feeding, most common among urban mothers being elders' advice (48.01%) and the apprehension regarding sufficiency of breast milk to meet the nutritional needs of the infant (31.77%). Whereas, in the rural areas mothers who had initiated complementary feeding prematurely had done so as they had reduced or no secretion of breast milk (44.44%) followed by the ones who were apprehensive about the nutritional adequacy of breast milk (33.33%).

Many of the rural mothers had delayed initiation of complementary feeding beyond 6 months of age most commonly because they felt that the secretion of breast milk was

sufficient enough to meet the nutritional needs of the infant (46.15%) or because infant was not accepting the foods given other than the breast milk (38.46%) or cannot afford commercial foods and were not aware of low cost weaning foods that can be prepared at homes (6.15%). Similar reasons were quoted by urban mothers with 37.50% mothers thinking breast milk to be sufficient and 25.00% unable to afford commercial feeds unaware of low cost home prepared weaning foods.

Most common weaning foods initiated first were porridges by 147 (36.75%) urban mothers and cow's milk by 124 (32.63%) rural mothers. Biscuits formed the first food of 4.75% urban and 16.05% rural infants *(Graph I).*



A majority of 152 (38.00%) urban mothers had given combination of various foods to their infants between 6 to 8 months of age and the number increased to 217 (54.25%) when the infants were in the age group of 9 to 12 months. Whereas, in the rural area as many as 142 (37.36%) mother gave only cereal based foods like porridges made of ragi, rava or rice and the number increased to 174 (45.79%) when the infant was in the age group of 9 to 12 months. Biscuits were the most common snack given by both urban and rural mothers in both the age groups of 6 to 8 and 9 to 12 months *(Table III).*

Majority of urban as well as rural mothers gave less than the recommended 3/4th of a 200 ml cup per feed during 6 – 8 months of age (76.50% and 62.63% respectively) and less than the recommended full of a 200 ml cup during 9 – 12 months (83.00% and 86.84% respectively).

During illness, only 6 (1.50%) urban and 3 (0.79%) rural mothers had increased the amount of food per feed. Out of the remaining, as many as 357 (89.25%) urban and 368 (96.84%) rural mothers had in fact reduced the amount. Majority the mothers who had reduced had done so thinking that the infant will be unable to digest the food during illness (81.79% in urban and 80.98% in rural areas), remaining mothers had tried giving more food but the infant had not accepted (18.21% in urban and 19.02% in rural areas).

Statistical association found between socio-demographic variables and type of breast feeding was not significant in the rural area. However, in the urban area, mothers' educational status had significant association with type of breast feeding till 6 months of age ($p<0.05$).

Statistically significant association was observed between age at initiation of complementary feeding and educational status of the mothers in both urban as well as rural areas; with place of delivery only in rural area, and with socio-economic status of mothers only in urban area ($p<0.05$).

WHO indicators for complementary feeding practice in urban and rural were calculated and compared. Introduction of solid, semi-solid and soft foods rate which indicates proportion of infants aged 6 to 8 months who receive solid, semi-solid and soft food was 98.50% in urban and 67.37% in rural area. Minimum dietary diversity rate which indicates the proportion of children who receive foods from 4 or more food groups was 54.75% in urban and 19.47% in rural area. Minimum meal frequency rate which indicates the proportion of children who receive solid, semi-solid, or soft foods the minimum number of times or more was 71.75% in urban and 41.05% in rural areas. Minimum acceptable diet rate which is a composite index of minimum dietary diversity rate and minimum meal frequency rate was 40.75% in urban and 15.78% in rural areas.

Discussion

Though breast milk, no doubt, is a tailor made drink for the infants, additional supplementation is necessary at 6 months of age to meet varied and increased nutritional demand of the rapidly growing little one. At the same time it is equally important to exclusively breast feed the infant till 6 months of age. However, exclusive breast feeding till 6 months of age was practiced only by 16.25% in urban and 15.26% in rural mothers. Majority of mothers practiced predominant breast feeding in both urban and rural area *(Table II).*

Various studies [4-6] at international level showed that exclusive breast feeding rate ranged from 10.70% to 61.00%. Studies [3, 7-13] done in various states of India demonstrated that exclusive breast feeding rate ranged from 23.50% to 69.35%. A study done in villages of Central Karnataka by Banapurmath ET al [14] showed that exclusive breast feeding rate at 4 months was 61.26%.

Present study conducted to understand and compare complementary feeding habits of urban and rural mothers showed that the majority of the 69.20% mothers in the urban area started complementary feeds before the age of 6 months; whereas, in the rural areas, 42.11% mothers did so at the age of 6 months. Difference in the age at which complementary feeds were started by urban and rural mothers was statistically significant ($p<0.001$) *(Table II).*

Elders' advice, coupled with mothers' apprehension about the nutritional adequacy of breast milk led to premature initiation of complementary feeds among urban mothers. Whereas, rural mothers were not much worried about nutritional adequacy of breast milk instead felt it was more than sufficient even beyond 6 months of age. More number of mothers who were literates initiated complementary feeds at an appropriate age of 6 months. Significant association of education with age at initiation of complementary feeds indicates the importance of education which makes the mothers more sensitive and understandable towards the health education given to them. Significant association with socioeconomic status in urban area suggests that affordability of weaning foods is a determinant of age at initiation of complementary foods as more number mothers of better socio-economic status (Modified B. G. Prasad Class I, II and III) initiated at or before 6 months of age compared to mothers of lower socio-economic status.

Similarly, in a study done by Mushaphi et al [15] in Vhembe District of Limpopo Province it was observed that about 77.30% mothers had started complementary foods to their infants before 6 months of age; most commonly they had done so as per elder's advice (45.00%). Contradictory observation was found in the urban and rural areas of Bihar in a study carried out by Yadav et al [16] that 17.70% urban and 13.10% rural mothers started complementary foods before 6 months of age and 53.70% urban and 54.20% rural mothers started complementary foods between 6 – 12 months of age. However, reason behind early weaning was found to be the apprehension that breast milk was not sufficient (30.00% in urban and 28.90% in rural area).

Observation along the same line of the present study was seen in yet another study done by Aggarwal et al [17] which showed that only 17.50% mothers had started complementary feeds at the recommended 6 months of age and most common reason for delayed weaning being unsuccessful attempt as child used to vomit (52.00%). The most common complementary food given first was porridge by urban mothers and cow's milk by rural mothers. The commercial food was given by more number of urban mothers compared to rural mothers. *(Graph I)* Difference in the first food started during weaning by urban and rural mothers was statistically significant ($p<0.001$). Since commercial foods are expensive, probably the affordable urban mothers gave it more than rural mothers.

In the urban area, most commonly, combination of various foods was given as meals at both age groups of 6 – 8 and 9 – 12 months. However, large proportion of mothers gave only biscuits as snacks in the urban area at 6 – 8 as well as at 9 – 12 months of age respectively. However, majority of mothers in rural area gave only cereal based foods for meals at 6 – 8 months and even at 9 – 12 months. Even in the rural area, biscuits were most commonly given as snacks between meals at both age groups. Frequency of feeding by majority of urban as well as rural mothers was satisfactory. However, amount given per meal was less than the recommended amount by majority of both urban as well as rural mothers. The difference between urban and rural mothers in the foods given for meals and snacks was statistically significant ($p<0.001$). *(Table II)* Probably, this can be attributed to either lack of awareness or lack of financial resources.

Contrary to the present study, Mushaphi et al [15] in Vhembe District of Limpopo Province it was showed that 37.80% of infants were receiving meals only twice a day. A study carried out by Aggarwal et al [17] in urban areas of Delhi showed that as many as 60.00% of mothers gave less than recommended frequency of complementary feeds and almost 75.00% of mothers gave less than recommended quantity as well.

Food intake has to be increased as the nutritional demands of the body goes up during illness in the form of soft, energy dense foods of the child's choice. However, majority of urban as well as rural mothers had reduced the amount of food given during illness which is not desirable. Perhaps, mothers apprehension about the digestive capacity of the child during illness and hence, restriction of the child's nutritional intake for the well being of the child can be attributed to their ignorance regarding the nutritional needs during illness. Complementary feeding indicators pointed that inadequacies exist in complementary feeding habits of both urban as well as rural mothers. Neverthless, rural mothers were far more worse than urban mothers.

Conclusion and Recommendations

Present study revealed inappropriateness of complementary feeding practices in terms of age at initiation, type of food given as well as amount and frequency. However, practices of urban mothers were far better than rural mothers. Elders' advice coupled with mothers' ignorance regarding appropriate practices led to faulty feeding habits. Hence, it is recommended that information, education and communication activities must be intensified in both areas with special attention to rural areas.

Low cost, locally available, nutritionally rich food preparations must be demonstrated by the grass root level workers during these sessions not only to the mother but also the elders of the family who influence the mothers the most. Maternal education and employment are equally important as they would increase a mothers' understanding and comprehending capacity and also affordability of the foods.

Doctors who care for the child during illness must make the mothers aware of the nutritional needs of the child during illness and should encourage mothers to give more and more soft, energy dense favorite foods that are easily digestible as well. More studies are required to know about the appropriateness of consistency of food and also the habits of cleanliness during preparation. Studies are also required to know whether the health education given in these regards is actually effective or not.

Limitations: It was not feasible in the present study to collect detailed information on exact amount of dietary intake as mothers were interviewed when the child turned one year old about their practice in the past. Hence, calorie and protein deficit of the infants could not be calculated. Since, practices of the past were asked, it was not possible to know about maintenance of hygiene during preparation and feeding. Since infants aged 1 year were only included in order to minimize recall bias, number of mothers continuing breast feeding till 2 years of age could not be found out.

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