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Determinants of Complementary Feeding Practices among Children Aged 6-23: a Community based Study

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Abstract

Background
Complementary feeding practices play an important role in growth and development of the children. This study aimed to determine the complementary feeding practices status among children aged 6- 23 months and its association with various socio- demographic factors.

Materials and Methods
This community based cross-sectional study was conducted at field practice area of Urban Health Centers in Khalkhal city, North West of Iran. In the preset study 576 mothers of children aged 6-23 months were selected with multistage random sampling method and interviewed using structured questionnaire for Infant and Young Child Feeding (IYCF) indicators (minimum dietary diversity (MDD), minimum meal frequency (MMF), and minimum acceptable diet (MAD). Data were analyzed with using SPSS-20.0, Chi-square, bivariate and multivariate logistic regression tests.

Results
Findings showed that MDD, MMF and MAD were adequate in 42.3%, 42.7% and 30.9%, respectively. MDD and MAD was significantly associated with gender of child, type of delivery, birth order of child, mothers literacy and health literacy (P<0.001); MMF was significantly associated with health literacy and literacy status of mother, birth order of child (P<0.001).

Conclusion
The study revealed that majority of mothers practiced inadequate complementary feeding. The feeding practices were found to be significantly associated with various socio- demographic factors which highlighted the importance of addressing these factors for improvement of feeding practices and prevention of various health related problems among children.

Key Words: Child, Complementary feeding, Minimum dietary diversity, Minimum meal frequency, Minimum acceptable diet.

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1- INTRODUCTION

The first two years of life are critical for brain, emotional, social and physical development and proper feeding practice is one of the most important factors for better health, optimal growth and development of children. Complementary feeding practice is a process of giving foods and liquids besides breast milk to provide the increasing nutritional requirement of child and infant due to the insufficiency of the breast milk (1, 2).

Adequate infant and young child feeding practices are crucial to support this development and provide protection from the risk of morbidity and mortality in low-resource environments. World Health Organization (WHO), and the United Nations International Children's Emergency Fund*'s* (UNICEF) global recommendations for optimal infant feeding as set out in the Global strategy are exclusive breastfeeding for 6 months and nutritionally adequate and safe complementary feeding starting from the age of 6 months with continued breast feeding up to 2 years of age or beyond (1).

Poor complementary foods in quantities and quality in children less than 2 years of age have a detrimental effect on their health and growth. Even with exclusive breastfeeding, children do not receive sufficient dietary diversity and meal frequency after 6 months of age (3, 4). Inappropriate complementary feeding practices during the first two years of life increase the risk of under nutrition, illness, and mortality (5, 6), risk for deficiencies (7), and other potential risk factors associated with poor complementary feeding practices (8).

Malnourished children who survive are also getting more frequently sick and suffer from life-long consequences of malnutrition in their life such as adult non-communicable diseases (2, 3, 6). Each year, undernutrition and suboptimum breastfeeding (BF), more than three million deaths of children younger than age five years worldwide (9) while, evidence showed that optimal Infant and young child feeding (IYCF) practices could help to prevent from almost one-fifth of overall under-five age mortality (10). Evidences from Iran, showed that childhood malnutrition still remains as a health problem in Iran (11, 12), supplementary feeding had been started later than 6 months children (13) and time of complementary feeding starting was found as a problem in Iran (14).

Studies showed that the most important factors affecting the nutritional condition include socio-economic status, infant's health status, the time the supplementary food starts, educational level of parents, type of the food, and mother's belief (2, 13, 15). The nutritional quality of complementary nutrients not only is inadequate, but also not started in appropriate time, not given in sufficient amounts or not frequently enough (16).

Some studies were conducted about complimentary feeding among Iranian childs and infants, but most of them have focused on specific feeding behaviors such as breastfeeding and age at starting of supplementary feeding (2, 17). Also, all the mentioned studies have not surveyed these three indicators of nutritional status including dietary frequency, diversity and acceptable diet and association of these practices have not examined with health literacy of mothers.

Therefore, this study was conducted to determine the status of complementary feeding practices among children aged 6-23 months and its association with various socio- demographic factors.

2- MATERIALS AND METHODS

2-1. Study design and population

This community based cross- sectional study was conducted among 576 mothers

of children belonging to age group 6-23 months referred to urban health centers of Khalkhal city located in Ardabil province, North West of Iran, for a period of September 2015 to June 2016. The mothers of children aged 6-23 months were interviewed. For sample size calculation, we estimated considering the following 95 % confidence level (CI), Proportion (P) of 45 % for minimum meal frequency and margin of error of 4 % for minimum meal frequency. So, we have taken: n = 587 for our final sample size. After data collection 11 participants were excluded due incomplete answering to the study questionnaires (98.13% response rate).

2-2. Measuring tools: validity and reliability

Data were collected using structured questionnaire by trained interviewers. The questionnaire consisted from 5 parts including:

Part one: Socio demographic characteristics such as mothers and child age, gender of child, type of delivery, birth order of child, maternal literacy.

Part two: Minimum Dietary Diversity (MDD): Proportion of children with 6–23 months of age who received foods from four or more food groups of the seven food groups such as grains, roots and tubers; legumes and nuts; dairy products (milk, yogurt); Flesh foods (meat, fish, poultry and liver/organ meats); eggs; vitamin A-rich fruits and vegetables; and other fruits and vegetables (18).

Part three: Minimum Meal Frequency (MMF): Proportion of breastfed and non-breastfed children 6–23 months of age, who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children). This indicator was defined as: twice for breastfed infants 6–8 months, three times for breastfed children 9–23 months, and four times for non-breastfed children 6–23 months (18, 19).

Part four: Minimum Acceptable Diet (MAD): The minimum acceptable diet indicator combines standards of *dietary* diversity and feeding frequency by breastfeeding status. The numerator includes only those children who have received both the minimum dietary diversity and the minimum meal frequency for the child's breastfeeding status.

Part five: Heath Literacy questionnaire. The test of Functional Health Literacy in Adults (TOFHLA), is a valid and reliable indicator of patient ability to read health-related materials. The short version of the Test of Functional Health Literacy in Adults (STOFHLA), consisted of 36 reading comprehension in two passages [(A) instructions for preparation for an upper GI series, (B) patient's rights and responsibilities] and uses the modified Cloze procedure. Completing of the instrument needs 7 min. Health literacy was scored and categorized inadequate literacy (0–16); marginal literacy (17–22); and adequate literacy (23–36) (20).

2.3-Ethical consideration

The participants after taking informed verbal consent and exploring about the goals and nature of the present survey and ensuring about confidentiality. The study design was approved by Khalkhal faculty of Medical Sciences Research Council.

2-4. Inclusion and exclusion criteria

Inclusion criteria: The mothers who had a healthy child (without chronic illness, twins, congenital malformation), literate mothers who had willingness to participate.

2-5. Data Analyses

Data were analyzed using SPSS 20.0 and bivariate and multivariate logistic regression tests were used to test associations between MMD, MAD and MMF variables with sociodemographic variables includes gender and birth order

of child, health and academic literacy of mothers. P-value <0.05 were considered as significant.

3- RESULTS

The results of complementary feeding practices indicators showed that Minimum Dietary Diversity (MDD), was found to be adequate in 42.3% children, Minimum Meal Frequency (MMF), in 42.7% children and Minimum Acceptable Diet (MAD), in 30.9% children. Association of MDD among children aged 6-23 months with socio- demographic factors was presented in **Table.1**. The socio-demographic factors associated with MDD. Children with birth order third and above had significantly higher odds of having adequate MDD (Adjusted odds ratio [AOR] 3.7; 95% CI- 2.3 - 5.9) as compared to the children with birth order one. Children born to mothers belonging to academic literacy had significantly higher odds of having adequate MDD (AOR 4.3; 95% CI- 2.7 - 6.9) as compared to low literacy.

Also, children born to mothers adequate health literacy had significantly higher odds of having adequate MDD (AOR 6.5; 95% CI- 4.0 - 10.7) as compared to low health literacy. Same result was seen about male child compared to female child (**Table.1**). This means that children with birth order third and above had significantly better MDD than the children with birth order one, also, children who had mothers with adequate health literacy and academic literacy significantly had adequate MDD as compared to others.

Table.2 shows male child (AOR 4.8; 95% CI- 2.9 - 6.9) compared to female child, children born to academic level of literate mothers (AOR 7.6; 95% CI- 4.5 - 12.6) as compared to low literate level had significantly higher odds of having adequate MMF. Same result was seen about children with birth order third and above, and children born to mothers adequate health literacy. But a significant difference was not seen in the topic of delivery methods (**Table.2**). This means that male children, children with birth order third and above, children who had mothers with adequate health literacy and academic literacy, significantly had adequate MMF, compared the others.

Table.3 shows that children born with cesarean method had significantly higher odds of having adequate MAD as compared to normal delivery method. Male child had significantly higher odds of having adequate MAD (AOR 1.9; 95% CI- 1.3 - 2.7), as compared to female child. Children with birth order third and above had significantly higher odds of having adequate MAD (AOR 7.1; 95% CI- 4.4 - 11.6), as compared to the children with birth order two. Children born to mothers belonging to high academic and health literacy level had significantly higher odds of having adequate MAD as compared to others. This means that children born with cesarean, male children, children with birth order third and above children who had mothers with adequate health literacy and academic literacy, significantly had adequate MAD compared the others.

Table-1: Association of minimum dietary diversity (MDD) among children aged 6-23 months with socio- demographic factors

Variables	Sub-group	Minimal Dietary Diversity		OR (95% CI)	P- value
		Adequate N (%)	Inadequate N (%)		
Gender	Male	147 (54.4)	123 (45.6)	3.1 (2.0 – 4.3)	< 0.001
	Female	85 (27.8)	221 (72.2)		

Delivery	Normal	95 (39.4)	146 (60.6)	0.92 (0.63 – 1.2)	< 0.001
	Cesarean	138 (41.2)	197 (58.8)		
Birth order	1	88 (35.2)	162 (64.8)	1.4 (0.9 – 2.2)	0.11
	2	102 (58.6)	72 (41.4)	3.7 (2.3 – 5.9)	< 0.001
	3 and more	42 (27.6)	110 (72.4)	1	
Literacy	Primary school	70 (31.7)	151 (68.3)	1	
	Mid and high school	79 (34.3)	151 (65.7)	1.1 (0.7 – 1.6)	0.54
	Academic	85 (66.9)	42 (33.1)	4.3 (2.7 – 6.9)	< 0.001
Mother age	< 25	53 (61.6)	33 (38.4)	1.8 (1.1 – 3.1)	< 0.001
	26- 35	99 (31.2)	218 (68.8)	0.5 (0.3 – 0.7)	0.001
	36 - 45	80 (46.2)	93 (53.8)	1	
Mothers Health Literacy	Inadequate	64 (29.8)	151 (70.8)	1	
	Marginal	76 (32.2)	160 (67.8)	1.1 (0.75 – 1.6)	0.57
	Adequate	92 (73.6)	33 (26.4)	6.5 (4.0 – 10.7)	< 0.001

Table-2: Association of Minimal Meal Frequency (MMF), among children aged 6-23 months with socio- demographic factors

Variables	Sub-group	Minimal Meal Frequency		OR (95% CI)	P-value
		Adequate N (%)	Inadequate N (%)		
Gender	Male	168 (62.2)	102 (37.8)	4.8 (2.9 – 6.9)	0.001
	Female	78 (25.5)	228 (74.5)		
Delivery	Normal	97 (40.2)	144 (59.8)	0.82 (0.59 – 1.0)	0.149
	Cesarean	150 (44.8)	185 (55.2)		
Birth order	1	87 (34.8)	163 (65.2)	0.84 (0.55- 1.2)	0.4
	2	101 (58)	73 (42)	2.1 (1.39 – 3.4)	0.001
	3 and more	59 (38.8)	93 (61.2)	1	
Literacy	Primary school	69 (31.2)	152 (68.8)	1	
	Mid and high school	80 (34.8)	150 (65.2)	1.1 (0.7 – 1.7)	0.4
	Academic	97 (77.6)	28 (22.4)	7.6 (4.5 – 12.6)	0.001
Mother age	< 25	69 (80.2)	17 (19.8)	4.4 (2.3 - 8.0)	0.001
	26- 35	94 (29.7)	223 (70.3)	0.4 (0.3-0.6)	0.001
	36 – 45	83 (48)	90 (52)	1	
Mothers Health Literacy	Inadequate	60 (27.9)	155 (72.1)	1	
	Marginal	87 (36.9)	149 (63.1)	1.5 (1.1 – 2.2)	0.04
	Adequate	100 (80)	25 (20)	10.3 (6.0 – 17.5)	0.001

Table-3: Association of Minimal Acceptable Diet (MAD), among children aged 6-23 months with socio- demographic factors

Variables	Sub-group	Minimal Acceptable Diet		OR (95% CI)	P- value
		Adequate N (%)	Inadequate N (%)		
Gender	Male	103 (38.1)	167 (61.9)	1.9 (1.3 – 2.7)	< 0.001
	Female	75 (24.5)	231 (75.5)		
Delivery	Normal	55 (22.8)	186 (77.2)	0.5 (0.35 – 0.74)	< 0.001
	Cesarean	123 (36.7)	212 (63.3)		

Birth order	1	35 (14)	215 (86)	1	
	2	61 (35.1)	113 (64.9)	3.3 (2 – 5.3)	< 0.001
	3 and more	82 (53.9)	70 (46.1)	7.1 (4.4 – 11.6)	< 0.001
Literacy	Primary school	40 (18.1)	181 (81.9)	1	
	Mid and high school	54 (23.5)	176 (76.5)	1.3 (0.8 – 2.3)	0.16
	Academic	84 (67.2)	41 (32.8)	9.2 (5.5 – 15.3)	< 0.001
Mother age	< 25	27 (31.4)	59 (68.6)	1.2 (0.7 – 2)	0.4
	26- 35	87 (27.4)	230 (72.6)	1	
	36 – 45	64 (37)	109 (63)	1.5 (1 - 2.3)	0.02
Mothers Health Literacy	Inadequate	31 (14.4)	184 (85.6)	1	
	Marginal	57 (24.2)	179 (75.8)	1.8 (1.1 – 3)	0.01
	Adequate	90 (72)	35 (28)	15.2 (8.8 – 26.3)	< 0.001

4- DISCUSSION

To the best of our knowledge, this is the first study to assess the status and determinants of complementary feeding practices among children 6–23 months in Iran. In the present study, the prevalence of MDD among children 6–23 months was 42.3%. Similar prevalence was observed by Dasgupta et al. (46%) (21), and Reinbott et al., (44%) (22). However, prevalence lower than the current study was reported by Beyene et al., (12.6%) (19), Khan et al., (32.6%) (23), Mukhopadhyaya et al., (24.4%) (24), Mondal et al., (30.85%) (25), and Bentley et al., (13%) (26); and Singhal et al., noted a higher prevalence of minimum dietary diversity (79.6%) in their study (27), and Isaaka et al., reported that the proportion of children aged 6-23 months who met the minimum dietary diversity for breast-fed and non-breast-fed children was 51.4 % (8). In the present study the prevalence of MMF in 6-23 months' children was 42.7%. Similar prevalence was reported by Khan et al. (48.6%) (23), which is consistent with Mondal et al. (25), Bentley et al. (26), Singhal et al. (27), Aemro et al. (4), and Rao et al. (28), that found prevalence of MMF at 41.49%, 43%, 43.4%, 44.7%, 32%, respectively, but Reinbott et al. (22), Mukhopadhyaya et al. (24), and Parashar et al. (29), reported higher prevalence of MMF at 70%, 67.0% and 77.8%, respectively. Similar to our study, Isaaka et al. (2015), reported that the proportion of children aged 6-23 months who met the minimum meal frequency was 46.0 % (8). The prevalence of MAD among 6-23 months children in the current study was 30.9%. Similar results were found by other researchers such as Mukhopadhyaya (31.5%) (24), and Singhal et al. (37.7%) (27). However, Reinbott et al., Khan et al., and Bentley et al., found a lower prevalence of MAD among children 6-23 months than the current study at 28%, 19.7%, 5%, respectively (22, 23, 26). On the other hand, Khanna et al., reported higher prevalence of MAD (65.95%) than the current study (30).

The prevalence of MDD was significantly associated with health literacy, child's gender, birth order of child, mother literacy and age of mother in the present study. This finding is in line with Joshi et al. (2012), which indicated that mothers with primary or no education were significantly less likely to give complementary foods, to meet MDD (31); this finding is reasonable due to the associations of educational level with health literacy (32). Also, our results consistent with other similar studies which observed significant association between MDD and sex of child (21), and area of residence (29). Aemro et al. (2013), in

their study found that significant association exists between MDD and birth order, mother's education, area of residence socio-economic status (4). Beyene et al. (2015), found that a birth order of index child consistently associated MDD (19), and Khanal et al. reported significant association of MDD with birth order, place of delivery, mode of delivery, mother's education, religion, socio-economic status, antenatal care (15). The current study showed that the prevalence of MMF was significantly associated with health literacy, child's gender, literacy status of mother. Consistent with our findings, Lohia et al. (2014), found that males child < 12 months of age, had a higher feeding frequency score compared females in the same age category (33). But in Cs et al., mother's education was negatively associated with minimum dietary diversity (34).

In other similar studies the prevalence of MMF was significantly associated with the literacy status of mother (21), area of residence (29), birth order of child, mother's education, socio- economic status (4). In a study was done by Khanal et al. significant association exists between the prevalence of MMF and maternal education, antenatal care was observed (15). Also, Beyene found that a birth order of index child consistently associated with MMF (19), but in Cs et al., mother's education was negatively associated with minimum meal frequency (34).

Mother with academic level of literacy and with adequate health literacy had higher complementary feeding practices, this finding is in line with Joshi et al. (2012), that multivariate analysis indicated that mothers with primary or no education were significantly less likely to give complementary foods, to meet minimum meal frequency (31), this can be attributed to association of educational level with health literacy (32).

The prevalence of MAD was significantly associated with gender of child, birth order of child, health literacy and literacy of mother. Dasgupta et al., found that the prevalence of MAD was significantly associated with gender of child (21), and the study done by Khanal et al., found that there was significant association between minimum acceptable diet and place and mode of delivery, mother's age and education(15). But in Cs et al., mother's education was negatively associated with minimum acceptable diet (34). Summary, complementary feeding practices were found poor among less than two years age which is in line with similar studies in Iran (17), and worldwide (35).

With poor complementary feeding practices after 6 months of age children will become stunted (3). Our findings are in line with the report by Lohia et al. (33), and Black et al. (3), that feeding scores for children were relatively poor and contributed to about half of the total score. Children with inappropriate feeding cant receive adequate amounts of important macro and micronutrients over a long time and will affected with various diseases and their growth and development will impaired. This is a vital finding and needs attention because poor feeding practices is associated not only with poor physical and mental growth but also can lead to irreversible cognitive abilities (36).

4-1. Limitations and Strengths of the study

The present study has some limitations, first, data were not analyzed according to age of child and illiterate mothers were not participated in the study. Similar to other cross-sectional studies, the nature of the data limits the present study to draw any causality. The data collected by interviewing with mothers and recall bias was also possible and may affect the validity of the findings.

To our best knowledge, our study is the first Iranian survey that studied all three complimentary feeding indexes among Iranian children aged 6 to 23 months and present more important findings on the association between the WHO recommended indicators and the nutritional status among them.

5- CONCLUSION

The study concluded that the prevalence of complementary feeding is still below the WHO-recommended standard of 90 % coverage, so that inadequate complementary feeding practices were present among approx. half of the study population. The study also showed that various socio- demographic factors (such as gender, birth order, literacy, etc.), play an important role in complementary feeding practices. Therefore, these factors need to be addressed to ensure optimal feeding practices among study population. This study highlights that certain socio-demographic factor plays a significant role in adequate complementary feeding practices.

6- CONFLICT OF INTEREST: None.

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