Impact of Infant Feeding Pattern on Growth Parameter at Azady Health Care Center/Erbil City

تأثير نمط تغذية الرضع على المعدل الطبيعي للنمو في مركز آزادي للرعاية الصحية / مدينة أربيل

Kaify Jamil Qadir, Assistant lecture; Msc. in Pediatric Nursing / Hawler Medical University / College of Nursing
E mail: kaifyjamil@yahoo.com

الخلاصة:
الخلفية : التغذية الكافية أثناء مرحلة الرضاعة و الطفولة المبكرة ضرورية لضمان النمو والصحة و تنمية الأطفال إلى كامل إمكاناتهم. وقد تم الاعتراف في جميع أنحاء العالم أن الرضاعة الطبيعية مفيدة لكل من الأم والطفل، كما يعتبر حليب الثدي أفضل مصدر لتغذية الرضع .
الهدف: ايجاد أثر الرضاعة الطبيعية على معدل النو الطبيعي للرضيع .
المنهجية : أجريت دراسة وصفية في مركز الرعاية الصحية آزادي خلال الفترة من مطلع حزيران إلى أواخر اب 2014 على 100 الرضع . جمعت البيانات عن طريق مزيج من استبيان منظم و قياسات الطول (أو الارتفاع) ، والوزن . وقد تم تحليل النتائج باستخدام SPSS Version19 .
النتائج : من أصل 100 الخاضعين للدراسة ، كانت 54٪ من الإناث 59 (59٪) الفئة العمرية من 4-6 أشهر. معظم الأعمار الأمهات (66٪) كانت بين 21-30 عاما. غالبية الرضع هي على التغذية المختلطة 55 (55.0 ٪) ، في حين أن 35 (35.0 ٪) و 10 (10.0 ٪) على الثدي الحصري و الرضاعة الصناعية على التوالي . وفقا لطول / مؤشر الطول مقابل العمر، و كانت 52.0 ٪ من الموضوعات ضمن المعدل الطبيعي و كان 34 ٪ منهم يعانون من التقزم للخطر ، كان 62 ٪ من الرضع ضمن المعدل الطبيعي و 27.0 ٪ معرضون لخطر لنقص الوزن عن الوزن الطبيعي الوزن بالنسبة للعمر ، و الوزن بالنسبة للطول / ارتفاع كانت 47.0 ٪ منهم ضمن المعدل الطبيعي، 24.0 ٪ معرضون لخطر و إهدار 22.0 ٪ لخطر زيادة الوزن .أشارت النتائج بوجود ارتباط كبير بين تغذية الرضيع مع الوزن بالنسبة للعمر و الوزن بالنسبة للطول Z- النتيجة في المقابل ليس هناك ارتباط كبير بين تغذية الرضع مع طول العمر Z- النتيجة .
الاستنتاجات: وجدت الدراسة إلى أن هناك علاقة بين نمط تغذية الرضع و والمعدل الطبيعي للنمو (الوزن بالنسبة للعمر و الوزن بالنسبة لل طول Z- النتيجة) .
التوصيات : تشجيع الأمهات على مواصلة زيارة مركز الرعاية الصحية لرصد والحث النمو وإعطاء الرضاعة الطبيعية الحصرية على الأقل لمدة ستة أشهر الأولى و بعد ذلك يمكن أن تبدأ من خلال التغذية التكميلية.
مفردات البحث: التأثير ، و الرضع ، والتغذية ، والنمو .

Abstract
Background: Adequate nutrition during infancy and early childhood is essential to ensure the growth, health, and development of children to their full potential. It has been recognized worldwide that breastfeeding is beneficial for both the mother and child, as breast milk is considered the best source of nutrition for an infant.
Objective: To find out the impact of infant feeding pattern on growth parameter.
Methodology: An evolutional study was conducted at Azady Health Care Center during the period of early June to late August 2014 on 100 infants. Data were gathered by a combination of a structured questionnaire and measurements of length (or height), and weight. Results were analysed using SPSS Version19.
Results: Out of 100 study subjects, 54% were female with 59 (59%) age group of 4-6 months. most of mothers' ages (66 %) were between 21-30 years. Majority of infants are on Mixed Feeding 55(55.0%), while 35 (35.0%) and 10 (10.0%) on Exclusive Breast and Bottle Feeding respectively. According to length/height-for-age index, 52.0% of subjects were within normal range and 34% of them were risk for stunted, 62% of infants were within normal range and 27.0% risk for underweight of weight for age, as weight-for-length/height 47.0% of them were within normal range, 24.0% risk for wasted and 22.0% risk for overweight. Statistically there is significant association between infant feeding with weight for age and weight for length Z-score in contrast there is no significant association between infant feeding with length for age Z-score.
Conclusion: the study presented that there was relationship between infant feeding pattern and growth parameter (weight for age and weight for length Z-score).
Recommendation: encouraging the mothers to continue visiting Health Care Center for monitoring growth and give exclusive breast feeding at least for 1st six months and after that can start by supplementary feeding.
Key words: impact, infant, feeding, growth.

INTRODUCTION

Adequate nutrition during infancy and early childhood is essential to ensure the growth, health, and development of children to their full potential. It has been recognized

worldwide that breastfeeding is beneficial for both the mother and child, as breast milk is considered the best source of nutrition for an infant[1].

When breast milk or infant formula no longer supplies infants with required energy and nutrients to sustain normal growth and optimal health and development, complementary feeding should be introduced[2].

The new WHO recommendation is of exclusive breastfeeding for 6 months and complementary feeding after 6 months of age[3].

For proper growth and development, an infant must obtain an adequate amount of essential nutrients by consuming appropriate quantities and types of foods. During infancy, a period of rapid growth, nutrient requirements per pound of body weight are proportionally higher than at any other time in the life cycle. Although there are many nutrients known to be needed by humans, requirements have been estimated for only a limited number of these[4].

The first decision that parents make regarding infant nutrition is the decision to breast feed or bottle feed their newborn. Although the composition of infant formula is similar to that of breast milk, and many babies thrive on proprietary formula, breast milk is still considered to be the best option for optimal health promotion and disease prevention in the newborn[5].

The major advantage of exclusive breastfeeding from 4 to 6 months includes reduced morbidity due to gastrointestinal infection[6].

In 2006, the World Health Organization (WHO) published the first international growth standard, which replaced previously used growth references from the Centers for Disease Control and Prevention and other groups[7].

The most common anthropometric measurements to assess infant growth are body weight and length. When these measurements are taken repeatedly on the same individual over time, it renders the analysis of the growth process more consistent[8].

The present study investigates the effect of infant feeding pattern on growth parameter from 1 to 6 months of life.

Objectives of the study: To evaluate the impact of infants feeding pattern on their growth

METHODOLOGY

Design of the study:

An evaluation study was carried out during the period of early June to late August 2014.

Setting of the study:

The study was carried out at Azady Primary Health Care Center / Erbil city.

The sample of the study:

A non-probability (purposive) sample of 100 mothers whose infants were ages between 1-6 months who had been attended Primary Health Care Center for vaccination their infants were selected as study sample

Instrument of the study

Through the review of related literatures, the investigator constructed the questionnaire format. The questionnaire was used as a mean of data collection; it was comprised of three major sections.

Section I: demographic information of mothers and infants: Age, address, education level, occupation of mothers, date of birth and gender of infants.

Section II: Assessment of infant feeding pattern: breast, bottle and complementary feeding

Section III: Anthropometric parameters: The child's age, sex, and measurements of weight and length or height will be used to calculate the following growth indicators [WHO Child Growth Standards for boys and girl 0-6 months[9]];

- length/height-for-age
- weight-for-age
- weight-for-length/height

WHO criteria was used to categorize children as normal, underweight, stunted and wasted **(Table I).**

Table I: Categorizing of infant growth according WHO9.

Categorized	length/height-for-age	weight-for-age	weight-for-length/height
-3	**severely stunted**	**severely underweight**	**Severely wasted**
-2	**Stunted**	**Underweight**	**Wasted**
-1	**risk for stunted**	**Risk for underweight**	**Risk for wasted**
0	**Normal**	**Normal**	**Normal**
+1	**=**	**=**	**Risk for overweight**
+2	**high statue**	**Overweight**	**Overweight**
+3	**high statue**	**Obese**	**Obese**

Methods of data collection:

Data were collected through the use of a questionnaire tool and interview techniques were used as a mean of data collection.

Statistical Analysis:

Data was analyzed using SPSS version19. Chi-square tests were used to evaluate relationships between different selected variables (e.g., to find association between infant feeding and demographic characteristics :such asAge, Education Level, occupation of mothers and sex of child; association between infant feeding and growth parameter such as: weight for age (WA), length for age (LA), and weight for length (WL) z scores). Critical value for significance was set at $P < 0.05$ and for highsignificance was set at $P < 0.01$.

RESULTS

Table 1: Demographic Characteristic of Mothers and Infants:

Items		Frequency n=100	Percentage
Age of mothers:	21-25 year	36	36
	26-30 year	30	30
	31-35 year	23	23
	36-40 year	11	11
Address/ Hawler:	Quran	26	26.0
	Zanyary	9	9.0
	Zhyan	10	10.0
	Rasty	5	5.0
	Azady	50	50.0
Mother's level of education:	Illiterate	5	5.0
	Primary school	38	38.0
	Secondary	14	13.0
	Institute	13	14.0
	High education	30	30.0
Occupation of mothers:	House wife	60	60.0
	Employee	40	40.0
Age of infant:	1-3 month	41	41.0
	4-6 month	59	59.0
Sex:	male	46	46.0
	female	54	54.0

Table (1) reveals that the most of mothers' ages were between (21-25) 36 (36 %), half percentage of them were living in Azady Quarter /Hawler City, the highest percentages of mother's education level were in primary schools which present 38 (38%) and 58 (58%) of them were House wife. Regarding the age of infants most of them were between 4-6 months 59 (59%), and slightly more than half of them were female 54 (54%).

Table 2: Type Infant Feeding

Items	Frequency n=150	Percentage
type of Feeding :		
Exclusive Breast Feeding	35	35.0
Bottle Feeding	10	10.0
Mixed Feeding	55	55.0

Table 2 shows that more than half of infants are on Mixed Feeding 55(55.0%), 35 (35.0%) on Exclusive Breast Feeding and 10 (10.0%) on Bottle Feeding

Table 3: Assessment of Breast Feeding

Items	Frequency	Percentage
Giving of Colostrums :	**n=100**	
Yes	**89**	**89.0**
No	**11**	**11.0**
Frequency/ day:	**n=90**	
2-5 time/day	**29**	**67.8**
6-9time/day	**61**	**32.2**
Duration of feeding	**n=90**	
5-10minute	**48**	**53.3**
10-15	**32**	**35.6**
15-20	**10**	**11.1**
Time of weaning	**n=10**	
2-4month	**8**	**80.0**
5-6 month	**2**	**20.0**

Table 3 indicates that 89 percentage of mothers have given colostrum to their children, most of them give Breast Feed 6-9 time/day 61 (67.8%) for 5-10 minutes 48 (53.3%) and 10 mothers have weaned their children from Breast Feeding 8 of them weaned at 2-4month (80.0%) and others at 5-6 month 2 (20.0%).

Table 4: Assessment of Supplementary Feeding

Items	Frequency	n=6	Percentage
Type of food:			
Cereal	**2**		**33.3**
Soup Rice	**3**		**50.0**
Fruits	**1**		**16.7**

Table (4) shows that few number of mother gave Supplementary Foodfor their children :include 6 mothers half of infants feed soup rice 3 (50.0%), 2 (33.3) cereal and 1(16.7%) gave fruits.

Table 5: Association between some selected demographic characteristics with infant feeding

Items	Infant Feeding			Total	Chi-Square p-value
	Exclusive Breast Feeding	Bottle Feeding	Mixed Feeding		
Age of mother					
21-25 year	12 34.3%	4 40.0%	20 36.4%	36 36.0%	
26-30 year	10 28.6%	3 30.0%	17 30.9%	30 30.0%	
31-35 year	9 25.7%	1 10.0%	13 23.6%	23 23.0%	0.929
36-40 year	4 11.4%	2 20.0%	5 9.1%	11 11.0%	
Total	35 100.0%	10 100.0%	55 100.0%	100 100.0%	
Level Education					
Illiterate	2 5.7%	0 .0%	3 5.5%	5 5.0%	
Primary School	17 48.6%	3 30.0%	20 36.4%	40 40.0%	
2nd ary School	8 22.9%	1 10.0%	5 9.1%	14 14.0%	
Institute	4 11.4%	2 20.0%	7 12.7%	13 13.0%	0.236
High Education	4 11.4%	4 40.0%	20 36.4%	28 28.0%	
Total	35 100.0%	10 100.0%	55 100.0%	100 100.0%	
Occupation					
House Wife	27 77.1%	4 40.0%	29 52.7%	60 60.0%	
Employ	8 22.9%	6 60.0%	26 47.3%	40 40.0%	0.028
Total	35 100.0%	10 100.0%	55 100.0%	100 100.0%	
Sex					
Male	14 40.0%	9 90.0%	23 41.8%	46 46.0%	
Female	21 60.0%	1 10.0%	32 58.2%	54 54.0%	0.013
Total	35 100.0%	10 100.0%	55 100.0%	100 100.0%	

This table shows that there are no significant associations between Age and Education Level of mothers with type infant feeding while there are significant associations between Occupation of mothers and sex of infants with type infant feeding.

Table 6: association infant feeding with Length for Age z-score

Infant Feeding	Length For Age z-score					Total
	Severely Stunted	Stunted	Risk For Stunted	Normal	High Statue	
Exclusive Breast Feeding	2	2	11	20	0	35
	5.7%	5.7%	31.4%	57.1%	.0%	100.0%
Bottle Feeding	1	0	2	6	1	10
	10.0%	.0%	20.0%	60.0%	10.0%	100.0%
Mixed Feeding	3	4	21	26	1	55
	5.5%	7.3%	38.2%	47.3%	1.8%	100.0%
Total	6	6	34	52	2	100
	6.0%	6.0%	34.0%	52.0%	2.0%	100.0%
Chi-Square (X2) = 6.425 P value = 0.599						

This table shows that almost similar percentage were seen in three groups (Exclusive Breast Feeding, Bottle Feeding and Mixed Feeding infants) within normal range growth [Length For Age z-score] 20) 57.1%), 6) 60.0%) and 26 (47.3% respectively. so statistically (there is no significant association between infant feeding with length for age Z-score.

Table 7: association infant feeding with weight For Age z-score

Infant Feeding	Weight For age					Total
	Severely Underweight	Under weight	Risk For Underweight	Normal Weight	Obese	
Exclusive Breast Feeding	2	1	7	25	0	35
	5.7%	2.9%	20.0%	71.4%	.0%	100.0%
Bottle Feeding	0	0	1	8	1	10
	.0%	.0%	10.0%	80.0%	10.0%	100.0%
Mixed Feeding	3	4	19	29	0	55
	5.5%	7.3%	34.5%	52.7%	.0%	100.0%
Total	5	5	27	62	1	100
	5.0%	5.0%	27.0%	62.0%	1.0%	100.0%
Chi-Square (X2) = 15.6 P value = 0.048						

This table shows that infants who were breast fed had 25) 71.4%) within normal weight in comparison to infants bottle fed 8) 80.0 %and (29) 52.7%) for infants mixed fed.results statistically there is significant association between infant feeding with weight for age Z-score.

Table 8: association infant feeding with weight for length z-score

Infant Feeding	Weight For Length							Total
	Severely Wasted	Wasted	Risk For Wasted	Normal	Risk For Over weight	Over weight	Obese	
Exclusive Breast Feeding	1	1	5	20	7	0	1	35
	2.9%	2.9%	14.3%	57.1%	20.0%	.0%	2.9%	100.0%
Bottle Feeding	0	0	1	1	6	2	0	10
	.0%	.0%	10.0%	10.0%	60.0%	20.0%	.0%	100.0%
Mixed Feeding	1	1	18	26	9	0	0	55
	1.8%	1.8%	32.7%	47.3%	16.4%	.0%	.0%	100.0%
Total	2	2	24	47	22	2	1	100
	2.0%	2.0%	24.0%	47.0%	22.0%	2.0%	1.0%	100.0%
Chi-Square (X2) = 35.572 P value = 0.000								

This table shows the big deference between breast fed and bottle fed infants within normal range (weight for length Z-score) 20) 57.1%) for breast fed, 1 (10.0%) for bottle fedand just under half 26) 47.3%) for mix fed.highest percentage of infants bottle fed found in risk the

forover weight 6) 60.0%). So statistically there is high significant association between infant feeding with weight for length Z-score.

DISCUSSION

There is general agreement that breastfeeding is good for the growth and health of infants. In less developed countries it may be the only way to provide complete nutrition for sustaining neonates' growth during the first 4-6 months of life, while at the same time reducing the incidence of infectious diseases such as diarrhoea and respiratory tract infections during the first year[10]. The present study investigated the effect of infant feeding during 1st 6 month of life on growth.

This study showed that most of mothers' ages (66 %) were between 21-30, the highest percentages of education level of them were in primary schools 38 (38%) and 58 (58%) of them were Housewives (Table 1), which is similar to the finding of Hussain[11], (2010) was conducted in Al-A'adamyia Primary Health Center in Baghdad, he showed that most of women in the sample were of age group 21-30 in a rate of (60.2%), 34% of them had a 6 years education and 73.2% of the sample was housewives.

Regarding the age of infants most of them were age between 4-6 months 59 (59%), just above half of them were female 54 (54%) and 46 (46.0%) were male (Table 1) . The [12]similar result reported by hussain, (2013) was a descriptive survey carried out in the Primary Health Care Centre of Al-Kadhymia town in Baghdad shows that 744 infants were recruited in this study, 354 (47.58%) were males and 390 (52.42%) females. There were 322 (43.2%) infants below 6 months of age.

The recent study revealed that more than half of infants are on Mixed Feeding 55 (55.0%), 31 (35.0%) on Exclusive Breast Feeding and 10 (10.0%) on Bottle Feeding (Table 2). Deferent results found regarding infant feeding rate to the present study; Hussain[11] (2010) foundthat 60% of women in his study were breast feeding their babies and 14.8% were feeding their babies both breast and bottle milk, while the rest gave bottle milk only. In New Zealand the rate of exclusive breast feeding was 34% but in Tehran the rate was higher than that of the current study as it was 74.5% .

In Erbil city a study done by Shaker et al.,[13] (2012) in 13 Primary Health Care Centers they reported that the Majority of surveyed infant and young child's feeding pattern was mixture feeding.

A study done in four Primary Health Care Centers in Thi-Qar by Hussien[14] (2011) he showed that 55.1% exclusive breast feeding, 35.7% mixed feeding and 9.1% bottle feeding among infants less than 6 months.

Majeed[15] (2008) stated in Iraq, the mode of breast feeding is predominant as a pattern of feeding, but full or complete breast feeding (only added plan water) is much more common (48.5%) in infants aged 0-5 months, while exclusive breast feeding (no added food nor fluid including water) occurred in 13.3% of infants from 0-5 months of age in Iraq.

In the present study 89% of mothers have given colostrum to their children birth (Table2), this result consistent with the result of Saha et al., [16] (2008) they revealed that patterns Colostrum and prelacteal feeding about 92% of mothers gave colostrum to their infants, and only 8% of them gave prelacteal food or drink.

With respect to the frequency of breast feeding and duration; the recent study discovered that Most of mothers gave Breast Feed 6-9 time/day 61 (67.8%) and 48 (53.3%) of them gave for 5-10 minutes duration (Table3 .(

Susan & Shelton[5] (2009) mentioned that the infant is very efficient in the removal of milk, frequent feeding (at least every 2 to 3 hours) (8 to 12 times a day at first) is advised to minimize the stasis of milk. The infant should feed at each breast at least 15 to 20 minutes

until at least one breast softens after the feeding. also a study conducted inNutrition Clinic of a tertiary care hospital of West Bengal, India by Shrivastava et al., [17] (2013) they reported that the most of breast feeding 65.9% (64/97) of the babies were breast fed 8 times or more during 24 hours.

Total number of weaned in the present study were 10 infants 8 (80.0%) of them at 2-4month and 2 (20.0%) at 5-6 month (Table 3) few numbers of mothers gave Supplementary Food for their children include 6 mothers: half of infants feed soup rice, 2 (33.3%) Cereal and 1(16.7%) fruits (Table 4). Motee et al.,[18] (2013) reported that the complementary feeding was more commonly initiated around 4–6 months (75.2%) and partial weaning (when baby is breastfed once or twice per day while receiving complementary foods) was the most common type of weaning practiced by mothers (62.8%).

Susan & Shelton[5] (2009) stated that the first solid food offered to the infant should consist of an iron-fortified rice cereal prepared by mixing one teaspoon of cereal with 4 to 5 teaspoons of breast milk or formula.

A study conducted by Butte[19](2009) reported that A pooled World Health Organization (WHO) analysis of growth data on breast feeding infants from the United States, Canada, and Europe showed consistent downward trends after 2 to 3 months in National Center for Health Statistics (NCHS) weight-for-age, length-for-age, and weight-for-length z scores to means of -0.5, -0.29 and -0.32 at 12 months of age, respectively.

Association between some selected demographic variables with infant feeding; in the recent study there is no significant relationship between age and education level of mothers and there is significant relationship between occupations of mother, sex of child with type infant feeding (Table 5). This is partially supported by Hussain, [11] (2010) he demonstrated that relationship of type of feeding with age of mothers was statistically insignificant. Unemployed mothers' breast feed their infants more frequently than working mothers and although the result is not significant the confidence interval was 80.8%, but in contrast with education variable which the result statistically was highly significant as P value was less than 0.01.

Other study supported recent results which done by Hussien[14] (2011) showed that there was no significant association between patterns of infants feeding and age, parity and educational level of mothers. Also agree with the result of Al-zamili[20] (2010); the study done in Diwaniya he found that there was no significant effect from the educational and economic status of the parents on the feeding type, when disagree with this results which shows there was no statistical significant between the type of feeding and sex distribution of children in their study

To determine the effect of infant feeding pattern the present study reported that there is no significant association between infant feeding with length for age Z-score (Table 6). This results is dissimilar to the result of Hussein[12] (2013) he shows (length for age percentiles) there is statistically significant as P value was 0.05 with infant feeding.

The recent study shows that infants who were breast fed had 25 (71.4%) within normal weight in comparison to infants bottle fed 8 (80.0 %) and 29 (52.7%) for infants mixed fed. Also only 10% of bottle fed infants were obese (Table 7). Results statistically there is significant association between infant feeding with weight for age Z-score, this result supported by Hussain[12] (2011) who reported that infants who were breast fed had lower rate of overweight as only 15.8% of them were within the 85th -95th percentile in comparison to infants fed with bottle who had a rate of 26.9%, and infants fed both breast and bottle milk (25%). The result is statistically significant as P value was 0.05.

Dewey[21] (2003) observed that formula-fed infants consume more milk and gain body weight more rapidly than breastfed infants, behavior that is prone to a higher obesity risk.

Butte[19]) 2009mentioned that the (Epidemiological studies have identified several risk factors for childhood obesity, including infant-feeding practices. Breastfeeding appears to have a small but consistent protective effect against childhood obesity.

Last table 8; shows the big deference between breast fed and bottle fed infants within normal range (weight for length Z-score) 20 (57.1%) for breast fed, 1 (10.0%) for bottle fed and just under half percentage 26 (47.3%) for mix fed. the highest percentage of bottle fed infants found in the risk for over weight 6 (60.0%), 7 (20.0%) for breast fed and 9) 16.4%) for mix fed. So statistically there is high significant association between infant feeding with weight for length Z-score.

This finding consistent with the result of Hussein (2013) who observed that the weight for height percentiles of the three groups of infants was highest within the 85-95th being higher in bottle fed infants (78.1%), followed by infants with mixed feeding in a rate of 77.8% and breast fed infants in a rate of 69.7%.The result is statistically significant as P value was <0.05.[11]

CONCLUSIONS

Just above half percentage of infants were within normal range of growth parameter according WHO child growth standards. There was strong relationship between infant feeding pattern and growth parameter.

RECOMMENDATIONS:

Based on the findings and conclusions, the investigator suggests the following recommendations:

1. Encourage the mothers to continue visiting Primary Health Care Center for vaccination and monitoring growth of infants.
2. Encourage the mother to give exclusive breast feeding at least 1st six months and after that start by supplementary feeding.
3. The study can be replicated on a larger sample, there by findings can be generalized.

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