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BARRIERS AND FACILITATORS FOR EARLY AND EXCLUSIVE BREASTFEEDING IN THE DUHOK GOVERNORATE IN IRAQI KURDISTAN

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A. Study design/planning
B. Data collection/entry
C. Data analysis/statistics
D. Data interpretation
E. Preparation of manuscript
F. Literature analysis/search
G. Funds collection

Summary

Background. Breast milk is the best food satisfying a baby's needs. Sociodemographic factors, antenatal care practices, and professional assistance at birth may be barriers against this. The aim of the study was to estimate the prevalence of exclusivity and to identify the barriers to breastfeeding.

Material and methods. A cross-sectional study was conducted from August 2022-2023 involving 336 mothers of infants (6-24 months) who visited primary healthcare centers. Information on socioeconomic background, pregnancy and delivery details, and awareness of breastfeeding benefits was collected using a pretested questionnaire. Data analysis was performed and a p-value ≤ 0.05 was considered significant.

Results. The whole number of infants breastfed was 146 (43.45%), and for six months, this was 25 (7.4%). The significant factors were: living in Duhok City, not having sufficient knowledge about the breastfeeding, decision to breastfeed during pregnancy, starting breastfeeding soon after delivery, vaginal delivery, order of birth, not giving sugar after delivery, being supported by the husband, holding the baby after delivery, knowledge of benefits of breastfeeding. The most significant factors associated with exclusive breastfeeding were maternal age <25 years, diseases during pregnancy, birth order (2nd or 3rd), explanation of the benefits of breastfeeding by health professionals, decision to exclusively breastfeed during pregnancy, delivery in a governmental hospital, and holding the baby after birth (OR=1.09, 1.037, 1.048, 1.677, 5.869, 1.097, and 2.45, respectively).

Conclusions. This study identified multifaceted barriers to early exclusive breastfeeding in the Duhok Governorate.

Keywords: Cesarean section, breastfeeding, formula, milk, infants

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Introduction

Prevention of infections and optimal growth and development are the most critical requirements of infants, especially in the first six months of life. Most frequently, breast milk is the best food that can fulfil all these needs for infants. It is the most reliable way by which the psychological and nutritional needs of

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an infant can be satisfied [1,2]. Suboptimal and non-exclusive breastfeeding in the first six months of life is responsible for 1.4 million deaths and 10% of the disease burden in children less than 5 years of age [3]. Exclusive breastfeeding of 90% of infants can lower children's death rates in low-income countries by 11.6% [4,5]. However, just 35% of infants are exclusively breastfed worldwide [6].

Globally, mothers who follow recommendations for breastfeeding could prevent 974,956 cases of obesity in childhood, 27,069 cases of maternal death from breast cancer, and 13,644 maternal deaths from ovarian cancer per year [7,8]. Globally, economic losses due to cognitive deficiencies caused by cessation of breastfeeding have been calculated to be approximately USD 285.39 billion dollars annually [8]. If exclusive breastfeeding rates are increased, the health outcomes of the population will improve [9], and failure to consider the structural and personal barriers will impact women's ability to breastfeed [10].

In low-income countries, sociodemographic factors such as maternal age, employment, education, cultural and religious practices, residency in addition to antenatal care practices, living arrangements, home delivery, and professional assistance at birth contribute to suboptimal breastfeeding practices. Understanding such factors is necessary to support mothers and has been reviewed in several studies [11]. A systematic review of barriers in low- and middle-income countries found that improper antenatal care, inadequate maternal care during birth, and going back to livelihood activities were significant barriers to exclusive breastfeeding [12]. The review also found that women delivering at a health facility were more committed to exclusive breastfeeding, which was also seen in other studies [13-20].

The common barriers to exclusive breastfeeding are the perception of insufficient breast milk and that breast milk cannot provide all the necessary vitamins and supplements. Another barrier is the mother's belief that foods and liquids are more nutritious than breast milk; thus, they introduce formula milk, water, and solid foods before six months of age. The need of the mother to return to work outside the home or the feeling of discomfort to breastfeed in public places are other barriers. Besides this, physical breast problems, such as breast engorgement, mastitis, cracked or inverted nipples, and sore nipples, are also challenges for mothers who breastfeed their children exclusively for six months [21-23].

In Iraq, although more than 9/10 of children were breastfed at some point in their young lives, only 25.8 % of them had exclusive breastfeeding during the first six months of life, which is much lower than the Middle East and North Africa regional average of 33% [24]. In Sulaimani in the Kurdistan region, a study found that among 198 mothers who participated in the study, 92 (46.5%) mothers were exclusively breastfeeding in the first six months of the baby's life [25], and in Duhok in the same region, only 8% were exclusively breastfeeding in the first six months [26]. Thus, the rate of exclusive breastfeeding in Iraq, especially in the Kurdistan region, is low. It is therefore essential to figure out the reasons for such a low rate of exclusive breastfeeding in the Duhok Governorate so that appropriate interventions can be developed and implemented.

Aim of the work

This study aims to estimate the prevalence of exclusive breastfeeding in the Duhok Governorate and to identify the barriers and facilitators in this area.

Material and methods

This cross-sectional study was conducted among mothers of 336 infants aged six months to two years in the Duhok Governorate, Iraqi Kurdistan. Random sampling was used, and the size of the sample was detected using the Cochrane sample size formula: $N= Z^2 * p *(1-p)/e^2$, where N= the population size, z = z score,

p = standard deviation, and e = margin of error. Exclusive breastfeeding rate is defined as the proportion of infants, aged less than six months, who received only breast milk without any other liquid or solid foods.

The sample was collected from mothers who had infants aged six months to one year and who visited primary healthcare centers when vaccinating their babies in Duhok City, Zakho, Akre, and Amedi from August 2022-2023. After obtaining informed verbal consent, relevant information was collected from the mothers of these infants using a pretested questionnaire. These included socioeconomic background characteristics, pregnancy and delivery characteristics, and awareness of breastfeeding benefits. The data collected was analyzed using Stata-14.2 (StataCorp, LLC, TX, USA) software. Fisher's exact test, *t*-test, and logistic regression were applied to assess the significance of associations, and a p-value ≤ 0.05 was considered as statistically significant.

Results

Of the total 336 participants, exclusive breastfeeding for six months was seen in 25 (7.4%) participants, for the first two months, this was seen in 69 (20.5%) participants, for the first four months, this was seen in 31 (9.2%) participants, for the first year, this was seen in 23 (6.8%) participants, and for the first two years, this was seen in 61 (18.2%) participants. While in 112 (33.3%) participants, there was mixed feeding from the beginning, and 15 (4.5%) participants stated they never breastfed. The overall number was 146 infants, with a rate of 43.45%.

As shown in Table 1, most mothers belonged to the age group of 20 to 30 years, were Muslim, and were university graduates. The mothers' ages at the time of marriage were 15 to 25 years of age in the majority of both groups. Income was moderate in the majority of mothers. None of these variables was significantly associated while considering the residence of mothers, 81.65% of breast-feeders and 68.72% of non-breast-feeders were from the city of Duhok, with a significant association (p=0.024).

Table 1. Distribution of respondents according to background characteristics

Background characteristics		Exclusive breastfeeding		Total	*p*
		Yes	No		
Mother's age in years	15-19	2 (1.83 %)	11 (4.84%)	13 (3.9%)	0.544
	20-29	72 (66.05%)	149 (65.63%)	221 (65.8%)	
	30-39	32 (29.35%)	63 (27.75%)	95 (28.3%)	
	40-50	3 (2.75%)	4 (1.76%)	7 (2.1%)	
Religion	Muslim	99 (90.82%)	216 (95.15%)	315 (93.8%)	0.301
	Yazidi	5 (4.58%)	6 (2.64%)	11 (3.3%)	
	Christian	5 (4.58 %)	5 (2.2%)	10 (3%)	
Education	Illiterate	1 (0.91%)	4 (1.76%)	5 (1.5%)	0.314
	Primary school	4 (3.66%)	16 (7.05%)	20 (6%)	
	Secondary school	28 (25.68%)	49 (21.58%)	77 (22.9%)	
	Institute	34 (31.19%)	54 (23.78%)	88 (26.2%)	
	University	42 (39.53%)	104 (45.81%)	146 (43.5%)	

Background characteristics		Exclusive breastfeeding		Total	*p*
		Yes	No		
Age when got married	15-24	68 (62.38%)	136 (59.91%)	204 (60.7%)	0.771
	25-34	40 (36.69%)	90 (39.64%)	130 (38.7%)	
	35-45	1 (0.91%)	1 (0.44)	2 (0.6%)	
City	Duhok	89 (81.65%)	156 (68.72%)	245 (72.9%)	0.024
	Zakho	17 (15.59%)	52 (22.9%)	69 (20.5%)	
	Amedi	0 (0%)	12 (5.28%)	12 (3.6%)	
	Akre	3 (2.75%)	7 (3.03%)	10 (3%)	
Daily hours of work	Not working	64 (58.71%)	131 (57.91%)	195 (58%)	0.093
	4 hours	15 (13.76%)	54 (23.78%)	69 (20.5%)	
	8 hours	24 (22.01%)	34 (14.97%)	58 (17.3%)	
	12 hours	6 (5.5%)	8 (3.52%)	14 (4.2%)	
Income	Good	14 (12.84%)	36 (15.58%)	50 (14.9%)	0.505
	Moderate	81 (74.31%)	170 (74.88%)	251 (74.7%)	
	Poor	14 (12.84%)	21 (9.25%)	35 (10.4%)	

Most mothers had regular antenatal visits, had no diseases during pregnancy, did not have doctors explain the benefits of breastfeeding during pregnancy, and nobody explained the correct way to breastfeed during pregnancy (65.89% of breastfeeding mothers and 55.95% of non-breast-feeding mothers, with no significant difference between both groups) (Table 2). While health professionals did not explain the benefits of breastfeeding for 66.98% of breastfeeding mothers and 77.54% of non-breastfeeding mothers, the decision to exclusively breastfeed during pregnancy was made by 87.15% of breastfeeding mothers and by 54.62% of non-breastfeeding mothers. Regarding the real practice of feeding after delivery, 89.9% of those who breastfed and 59.03% of those who did not breastfeed applied their decision about feeding that was made during pregnancy. The last three variables were significantly different between both groups (p=0.039, 0.0001, and 0.0001, respectively).

Table 2. Distribution of participants in relation to pregnancy and delivery

Variables		Exclusive breastfeeding		Total	*p*
		Yes	No		
Did you have regular antenatal visits?	**Yes**	92 (84.4%)	203 (89.42%)	295 (87.8%)	0.188
	No	17 (15.59%)	24 (10.58%)	41 (12.2%)	
Diseases during pregnancy	**Gestational diabetes**	6 (5.5%)	3 (1.32%)	9 (2.7%)	0.103
	Gestational hypertension	6 (5.5%)	19 (8.37%)	25 (7.4%)	
	Oligohydramnios	7 (6.42%)	15 (6.6%)	22 (6.5%)	
	Polyhydramnios	8 (7.34%)	19 (8.37%)	27 (8%)	
	Recurrent infections	13 (11.92%)	45 (19.82%)	58 (17.3%)	
	None	69 (63.3%)	126 (55.5%)	195 (58%)	
Did the doctor explain to you the benefits of breastfeeding?	**Yes**	29 (26.6%)	41 (18.06%)	70 (20.8%)	0.071
	No	80 (73.4%)	186 (81.94%)	266 (79.2%)	
Did the health professionals explain to you the benefits of breastfeeding?	**Yes**	36 (33.02%)	51 (22.46%)	87 (25.9%)	0.039
	No	73 (66.98%)	176 (77.54%)	249 (74.1%)	
During pregnancy, what was your intention about feeding the baby?	**Exclusive breastfeeding**	95 (87.15%)	124 (54.62%)	219 (65.2%)	0.0001
	Formula feeding	1 (0.91%)	4 (1.76%)	5 (1.5%)	
	Mixed feeding	13 (11.92%)	99 (43.61%)	112 (33.3%)	
After delivery, did you feed as you intended before?	**Yes**	98 (89.9%)	134 (59.03%)	232 (69%)	0.0001
	No	11 (10.1%)	93 (40.97%)	104 (31%)	
Did anybody explain to you the right way to breastfeed?	**Yes**	47 (43.11%)	100 (44.05%)	147 (43.8%)	0.872
	No	62 (65.89%)	127 (55.95%)	189 (56.3%)	

The variables related to after-delivery factors are shown in Table 3. Most babies had no respiratory distress or major congenital anomalies. The place of delivery in the governmental hospital, vaginal mode of delivery, birth order as being the first baby, giving nothing other than breast milk, like sugar and water, being supported and helped by the husband with breastfeeding, and holding the babies soon after delivery were significantly associated with exclusive breastfeeding (p=0.01, 0.046, 0.006, 0.0001, 0.023, and 0.0001, respectively).

Table 3. Distribution of participants according to variables after delivery

Variables		Exclusive breastfeeding		Total	*p*
		Yes	No		
Place of delivery	Governmental hospital	68 (62.38%)	123 (54.18%)	191 (56.8%)	0.01
	Private hospital	38(34.86%)	104(45.81%)	142 (42.3%)	
	Home of midwife	3 (2.75%)	0 (0%)	3 (0.9%)	
Mode of delivery	Vaginal	56 (51.37%)	92 (40.52%)	148 (44%)	0.046
	Cesarean section under general anesthesia	11 (10.1%)	45 (19.82%)	56 (16.7%)	
	Cesarean section under local anesthesia	42 (38.53%)	90 (39.64%)	132 (39.3%)	
Birth order of the last baby	First	46 (42.2%)	145 (63.87%)	191 (56.8%)	0.006
	Second	32 (29.35%)	44 (40.36%)	76 (22.6%)	
	Third	22 (20.18%)	26 (11.45%)	48 (14.3%)	
	Fourth	7 (6.42%)	9 (3.96%)	16 (4.8%)	
	Fifth	1 (0.91%)	0 (0%)	1 (0.3%)	
	Sixth	1 (0.91%)	3 (1.32%)	4 (1.2%)	
The condition of the baby after birth	Well	105 (96.33%)	204 (89.86%)	309 (92%)	0.12
	Respiratory distress	3 (2.75%)	19 (8.37%)	22 (6.5%)	
	Major congenital anomalies	1 (0.91%)	4 (1.76%)	5 (1.5%)	
Was the baby given anything other than breast milk after delivery?	Formula	18 (16.51%)	91 (83.48%)	109 (32.4%)	0.0001
	Sugar and water	16 (14.67%)	39 (35.77%)	55 (16.4%)	
	Nothing	75 (68.6%)	97 (42.73%)	172 (51.2%)	
Did your husband support and help you with breastfeeding?	Yes	97 (88.99%)	179 (78.85%)	276 (82.1%)	0.023
	No	12 (11.01%)	48 (21.15%)	60 (17.6%)	
Did you hold your baby soon after delivery?	Yes	94 (86.23%)	152 (66.96%)	246 (73.2%)	0.0001
	No, the baby was far away from me	15 (13.77%)	75 (33.04%)	90 (26.8%)	

Considering the awareness of mothers about the benefits of breastfeeding as per Table 4, the only significant differences in awareness were that breastfeeding protects mothers and children against many cancers and that it helps the baby maintains better sleep (p=0.032 and 0.005, respectively), while awareness about the other benefits was not significantly different between breastfeeding and non-breast-feeding mothers.

Table 4. Awareness of participants about the benefits of breastfeeding

Do you know about the following benefits of breastfeeding:		Exclusive breastfeeding		Total	*p*
		Yes	No		
Increases immunity against many diseases	Yes	107 (98.16%)	214 (94.27%)	321 (95.5%)	0.106
	No	2 (1.84%)	13 (5.73%)	15 (4.5%)	
Protects mother and child against many cancers	Don't want to answer	2 (1.84%)	4 (1.76%)	6 (1.8%)	0.032
	Yes	103 (94.49%)	194 (85.46%)	297 (88.4%)	
	No	4 (3.67%)	29 (12.78%)	33 (9.8%)	
Prevents constipation	Don't want to answer	0 (0%)	4 (1.76%)	4 (1.2%)	0.15
	Yes	88 (80.73%)	165 (72.68%)	253 (75.3%)	
	No	21 (19.27%)	58 (25.56%)	79 (23.5%)	
Helps the baby maintain better sleep	Don't want to answer	1 (0.91%)	5 (2.2%)	6 (1.8%)	0.005
	Yes	92 (84.4%)	153 (67.4%)	245 (72.9%)	
	No	16 (14.69%)	69 (30.4%)	85 (25.3%)	
Increases child's IQ	Don't want to answer	0 (0%)	2 (0.88%)	2 (0.6%)	0.15
	Yes	107 (98.16%)	202 (88.98%)	309 (92%)	
	No	2 (1.84%)	23 (10.14%)	25 (7.4%)	
Protects against obesity, diabetes mellitus, and asthma	Don't want to answer	0 (0%)	6 (2.64%)	6 (1.8%)	0.11
	Yes	95 (87.15%)	181 (79.73%)	276 (82.1%)	
	No	14 (12.85%)	40 (17.63%)	54 (16.1%)	
Less vaginal bleeding after delivery	Don't want to answer	3 (2.75%)	13 (5.72%)	16 (4.8%)	0.053
	Yes	77 (70.64%)	130 (57.26%)	207 (61.6%)	
	No	29 (26.61%)	84 (37.02%)	113 (33.6%)	
Rapid weight loss for the mother	Don't want to answer	0 (0%)	3 (1.32%)	3 (0.9%)	0.144
	Yes	90 (82.56%)	168 (74%)	258 (76.8%)	
	No	19 (17.35%)	56 (24.68%)	75 (22.3%)	
It is a natural contraceptive	Don't want to answer	2 (1.84%)	9 (8.25%)	11 (3.3%)	0.536
	Yes	80 (73.39%)	158 (69.6%)	238 (70.8%)	
	No	27 (24.77%)	60 (22.15%)	87 (25.9%)	
Protects the mother from type 2 diabetes mellitus and osteoporosis	Don't want to answer	2 (1.84%)	8 (3.52%)	10 (3%)	0.172
	Yes	76 (69.72%)	135 (59.47%)	211 (62.8%)	
	No	31 (28.44%)	84 (37.01%)	115 (34.2%)	

Table 5 shows that the feeding practice variables were significantly different between both groups of mothers, including the duration of exclusive breastfeeding, the reason for starting formula feeding, the age of stopping breastfeeding, and the reason for stopping breastfeeding (p=0.0001, 0.0001, 0.0001, and 0.0001, respectively).

Table 5. Distribution of participants in relation to the practice of feeding

Practice of feeding		Exclusive breastfeeding		Total	*p*
		Yes	No		
How long have you exclusively breastfed?	2 months	0 (0%)	69 (30.39%)	69 (20.5%)	0.0001
	4 months	0 (0%)	31 (13.65%)	31 (9.2%)	
	6 months	25 (22.93%)	0 (0%)	25 (7.4%)	
	One year	23 (21.1%)	0 (0%)	23 (6.8%)	
	Two years	61 (55.97%)	0 (0%)	61 (18.2%)	
	Mixed feeding from beginning	0 (0%)	112 (49.33%)	112 (33.3%)	
	Never breastfeeding	0 (0%)	15 (6.63%)	15 (4.5%)	
Why did you start formula feeding?	Formula feeding is painless and simple	3 (1.32%)	29 (12.77%)	32 (9.5%)	0.0001
	I felt down and couldn't breastfeed	4 (3.66%)	33 (14.53%)	37 (11%)	
	I always exclusively breastfed	61 (55.96%)	4 (1.76%)	65 (19.3%)	
	Most mothers I know were breastfeeding	3 (1.32%)	29 (12.77%)	32 (9.5%)	
	Formula feeding will increase weight gain	34 (31.19%)	34 (14.97%)	68 (20.2%)	
	The family encouraged me	0 (0%)	12 (5.28%)	12 (3.6%)	
	I did not have breast milk after the Cesarean section	1 (0.91%)	58 (25.55%)	59 (17.6%)	
	Persons from the hospital recommended a specific formula	3 (1.32%)	28 (12.33%)	31 (9.2%)	
When did you stop breastfeeding?	After 2-3 months	0 (0%)	133 (58.59%)	133 (39.6%)	0.0001
	After 6 months	17 (15.59%)	44 (19.38%)	61 (18.2%)	
	After 1 year	27 (24.77%)	27 (11.89%)	54 (16.1%)	
	After 2 years	65 (59.63%)	8 (3.52%)	73 (21.7%)	
	Never breastfed	0 (0%)	15 (6.62%)	15 (4.5%)	
Why did you stop breastfeeding?	Finished after two years	64 (58.71%)	5 (2.2%)	69 (20.5%)	0.0001
	I became pregnant	3 (2.75%)	3 (1.32%)	6 (1.8%)	
	I had a job	4 (3.66%)	20 (8.81%)	24 (7.1%)	
	I never breastfed	0 (0%)	15 (6.6%)	15 (4.5%)	
	No place for breastfeeding in public places	3 (2.75%)	8 (3.52%)	11 (3.3%)	
	Breast engorgement and inflammation	3 (2.75%)	20 (8.81%)	23 (6.8%)	
	The breast milk decreased and then stopped	22 (20.18%)	93 (40.96%)	115 (34.2%)	
	The baby refused to breastfeed	10 (9.2%)	63 (28.41%)	73 (21.7%)	

There was no signification relation between exclusive breastfeeding and the mother's age at the time of the study, as well as their age when married (p=0.302 and 0.258, respectively), as shown in Table 6.

Table 6. Relation of breastfeeding to mother's age

Mean +/- SD years					
Mother's age	**Exclusive breastfeeding**		***p*-value / T test**	**95% Cl**	
	Yes N=109	**No N=227**		**Lower**	**Upper**
Mother's age now	24.94±4.63	25.44±3.84	0.302	-1.439	0.448
Mother's age when married	24.75±4.75	25.33±4.12	0.258	-1.569	0.421

The multivariate logistic regression of the factors associated with exclusive breastfeeding shows that the age of the mother being < 25 years, diseases during pregnancy, birth order of second or third child, explanation of the benefits of breastfeeding by the doctor, the mothers' decision to exclusively breastfeed during pregnancy, delivery in a governmental hospital, and holding the baby after birth were significantly associated with exclusive breastfeeding (OR = 1.09, 1.037, 1.048, 1.677, 5.869, 1.097, and 2.45, respectively) (Table 7).

Table 7. Factors associated with exclusive breastfeeding-multivariate logistic regression analysis

Factors		**OR**	**95% CI for Exp(B)**		***p*-value**
			Lower bound	**Upper bound**	
Age group	**<25years**	1.09	0.647	1.837	0.745
	≥25years	-	-	-	-
Diseases during pregnancy	**Yes**	1.037	0.606	1.775	0.894
	No	-	-	-	-
Mode of delivery	**Cesarean section**	0.701	0.416	1.181	0.182
	Normal vaginal delivery	-	-	-	-
Birth order	**First**	0.422	0.152	1.173	0.098
	Second to third	1.048	0.373	2.94	0.93
	Fourth and above	-	-	-	-
Did the doctors explain to you the benefits of breastfeeding?	**Yes**	1.677	0.912	3.082	0.096
	No	-	-	-	-
During pregnancy, what was your wish about feeding?	**Exclusive breastfeeding**	5.869	3.041	11.324	0.004
	Formula feeding	1.501	0.14	16.064	0.737
	Mixed feeding	-	-	-	-
Place of delivery	**Governmental**	1.097	0.643	1.87	0.734
	Home/private	-	-	-	-

Factors		OR	95% CI for Exp(B)		*p*-value
			Lower bound	Upper bound	
Was the baby given anything other than milk after birth?	**Yes**	0.564	0.257	1.236	0.152
	No	-	-	-	-
Did you hold your baby after birth?	**Yes**	2.45	1.302	4.611	0.005
	No	-	-	-	-

Discussion

This study showed that the rate of breastfeeding was 43.45%, while those who exclusively breastfed for six months amounted to 7.4%. This rate is comparable with the rates found in other studies; 49.7% in India [1], 38.9% in Türkiye [27], 37% in Saudi Arabia [28], 48% in Ethiopia [29], and 38.6% in Gambia [30]. The rate is lower than what was found in other studies: 64.4% in Tigrai (Ethiopia) [31], 50.8% in Sri Lanka [32], 53% in Iran [33], and 66% in Ghana [34]. The rate of exclusive breastfeeding was higher than what was found in other studies: 11.4% in South India [35], 34% in South Africa [36], 25.5% in Jordan [37], while in a study that included different Middle Eastern countries, the rate was 20.5% [23].

Our study found that a maternal age younger than 25 years was in favor of exclusive breastfeeding, which was in agreement with a study in Ghana [34]. This is different from other studies that found no role of maternal age as a predictor for breastfeeding [1,23,38], while other studies found that older mothers are more likely to exclusively breastfeed [21,30,37]. The result of our study can be explained by the greater accessibility of younger mothers to social media and other sources of health education that encourage mothers to breastfeed.

The findings of our study showed that maternal education is not significantly related to exclusive breastfeeding, which is in line with other studies that also revealed similar results [39,40], while other studies showed found a significant association [25,33]. Some studies revealed that a higher educational level of the mother was associated with a higher rate of exclusive breastfeeding [27,31], and others found that mothers with lower educational levels were more likely to breastfeed [34,35], possibly because educated mothers may have more knowledge and accessibility to breast milk alternatives, which encourages them to quit breastfeeding [1].

Among sociodemographic factors, religion was not found to have a significant association with breastfeeding, which is in line with other studies [25,26], though some studies found it significant: a study in India found a higher rate of breastfeeding among Muslim mothers as compared to Christian and Hindu mothers. The Islamic religion strongly recommends breastfeeding in the first two years of life, as mentioned in the Holy Quran.

In this study, neither the employment of the mother nor the number of daily hours of work among employed mothers had a significant relation with breastfeeding, which is in contrast to many other studies that found that the mother's work was a barrier against breastfeeding [1,29,33,39-44]. The condition of work discourages the mother from continuing breastfeeding, and a study found that letting the mother leave work after delivery increased the rate of exclusive breastfeeding in the first six months [27]. The perceived income level of the family did not affect the rate of breastfeeding in the current study, though other studies found that higher family income was associated with a lower rate of breastfeeding [29,36], since the cost of formula does not impede the economic burden on the family, and this encourages mothers to discontinue breastfeeding.

The residence of mothers was significantly associated with breastfeeding, being higher among residents of Duhok City as compared to other cities, which was similar to what was found in a Saudi study [28].

We found that explanation of the benefits of breastfeeding by health professionals, the intention to feed, and the practice of feeding in congruence to a mother's intention during pregnancy were associated with exclusive breastfeeding. This is consistent with different studies that found that breastfeeding counseling to mothers and antenatal education programs were significantly related to exclusive breastfeeding [1,7,11,27,45,46] and that inadequate knowledge about breastfeeding was considered an important barrier to exclusive breastfeeding in studies conducted in Sri Lanka [32], in the state of Qatar [37], and in Saudi Arabia [28]. Similarly, the decision of the mother was also found to be significantly associated with exclusive breastfeeding [1,37,40]. Multivariate logistic regression also revealed that having health problems related to pregnancy, such as hypertension, diabetes mellitus, recurrent infections, oligohydramnios, and polyhydramnios, significantly affected the rate of exclusive breastfeeding. This finding is consistent with that reported by other researchers [1,27,47].

In this study, vaginal delivery in a governmental hospital was found to be significantly related to exclusive breastfeeding. This is consistent with other studies that had similar findings [1,23,27,29,33], though others found no impact of the mode of delivery on the rate of breastfeeding [35,38,42,43]. It is possible the mother's protective fear of movement and the perception of insufficient milk post-operatively after Cesarean section is a barrier against her ability to initiate breastfeeding, and as a result, this leads to dependency on formula feeding.

The birth order of the baby was found in this study to be significantly associated with exclusive breastfeeding, with the first and the second babies having the highest chance of being breastfed. This is in line with some other studies [1,35] but is in contrast with other studies that found higher birth order was associated with more exclusive breastfeeding [29,31], possibly because those having more children are less able to afford to formula feed their children. Not giving the babies anything other than breast milk soon after delivery is an important factor in favor of exclusive breastfeeding in our study. This has also been proven by other studies that concluded that early initiation of breastfeeding favors breastfeeding [1,38,45]. This finding suggests that observing correct breastfeeding practices in the first hours after birth can establish a strong foundation for exclusive breastfeeding. Our study also found that the husband's support and help of the mother to breastfeed her baby is strongly associated with exclusive breastfeeding in congruence with other studies [7,30], and the mother holding the baby soon after delivery significantly enables her to breastfeed the baby, which is an important step to initiate and maintain breastfeeding.

Considering mothers' awareness of the benefits of breastfeeding, this study revealed that awareness of breastfeeding protects the child and the mother against cancers and helps the baby maintain better sleep, which significantly enhances exclusive breastfeeding. This is in line with other studies [1,11,28,31,32,36,48]. Knowing the benefits of breastfeeding greatly encourages the mothers to continue breastfeeding.

Among the causes of starting formula feeding, most mothers in our study pointed out that formula feeding increases weight gain, and many of them said they did not have breast milk after delivery by Cesarean section. Concerning stopping breastfeeding, most mothers said that their breast milk decreased then stopped, and many of them claimed that the baby refused to breastfeed. Different studies have also found that inadequate breast milk was a major factor that led mothers to stop breastfeeding [7,21,22,49-51].

The main limitation of our study was firstly the fact that we could not establish the causal association, as the study design was cross-sectional. Secondly, past events or experiences could have been incompletely or

inaccurately stated by the mothers, leading to a recall bias, though we tried to minimize this possibility by including mothers of infants less than two years of age.

Conclusions

Our study identified significant barriers to exclusive breastfeeding in the Duhok Governorate, finding that the participant mothers reported multifaceted barriers to early exclusive breastfeeding. We recommend further research to examine whether system-level interventions can escalate the relatively low rate of breastfeeding by improving education on breastfeeding, reducing the influence of formula manufacturers, and providing tools for counselling.

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