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Determinants of Exclusive Breastfeeding in a Sample of Egyptian Infants

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Abstract

BACKGROUND: Breastfeeding is an optimum, healthy, and economical mode of feeding an infant. However, many preventable obstacles hinder exclusive breastfeeding in the first six months of life.

AIM: We aimed to assess the social-, maternal- and infant-related factors disturbing exclusive breastfeeding in the first six months of life.

METHODS: It is a retrospective study included 827 dyads of mothers and infants older than 6 months (411 exclusively breastfed, 311 artificially-fed and 105 mixed feds). Mothers were interviewed to obtain sociodemographic information, maternal medical history and perinatal history and a detailed history of infant feeding.

RESULTS: Many factors were found to support the decision for artificial feeding rather than exclusive breastfeeding, including maternal age < 25 years (OR = 2.252), child birth order > 3rd (OR = 2.436), being a primi-para (OR = 1.878), single marital status (OR = 2.762), preterm infant (OR = 3.287) and complicated labor (OR = 1.841). Factors in favor of mixed feeding included cesarean section (OR = 2.004) and admission to the Neonatal Intensive Care Unit (OR = 1.925).

CONCLUSIONS: Although it isn't a community-based study and its results can't be generalised, plans to improve health and development of children are preferable to include the following: health education and awareness programs about the importance of exclusive breastfeeding should be directed for young and first-time mothers. Improved antenatal care to reduce perinatal and neonatal problems; and training, monitoring, and supervising community health care workers to recognise labour complications and provide support and knowledge to lactating mothers.

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Keywords: Infant feeding; Exclusive breastfeeding; Mixed Feeding; Egyptian infants; Social factors

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Introduction

Infant feeding practices directly affect the nutritional status of children under two years of age and ultimately influence child survival [1]. Breastfeeding is an unequalled way of providing ideal food for the healthy growth and development of infants; it also affects the reproductive process, with important implications for maternal health [2]. The global public health recommendation is that infants

should be exclusively breastfed for the first six months of life, starting in the first half hour after delivery [3] [4]. Exclusive breastfeeding is defined as providing infants with only breast milk without the addition of water, herbal preparations or food in the first six months of life, except for vitamins, mineral supplements and medicine [5]. Non-exclusive breastfeeding can increase the risk of dying due to diarrhoea or pneumonia by more than two-fold among infants aged 0–5 months [6]. It is estimated that every day, as many as 4,000 infants and young children die

worldwide because they are not breastfed [7]. Moreover, recent studies indicated that increases the rate of non-communicable diseases such as diabetes, obesity, autoimmune disorders, and cardiovascular disease (CVD) is likely associated with a decrease in the practice of breastfeeding [8] [9].

There are various factors that affect the decision regarding the initiation and duration of exclusive breastfeeding, including sociodemographic factors (education level, monthly household income, and parity), residence and cultural beliefs, employment policies, health-related factors and biosocial factors (breastfeeding support) [10] [11]. Breastfeeding initiation and maintenance require the collaborative efforts of different medical and social subspecialties [12]. Unfortunately, health care providers may lack the skills and knowledge needed to help mothers improve their infant feeding practices [13].

In Egypt, there are gaps in the understanding why many mothers have difficulties in initiating and maintaining exclusive breastfeeding in the first six months of life and instead introducing artificial feeding. Therefore, exploring these difficulties is important for directing governmental intervention efforts to decrease infant morbidity and mortality.

The present study aimed to assess the social, maternal, and infant-related factors disturbing exclusive breastfeeding in the first six months of life.

Material and Methods

This study was a retrospective comparative study of exclusive breastfed, mixed fed and artificial-fed infants. It was a part of a project supported by National Research Centre of Egypt under the title of: "Infant Feeding Practices: Assessing Influence on general health, nutritional status, growth and development". The project ethical approval Number is 11020.

Mothers and their infants were recruited from the pediatric out-patient clinics of Ain Shams University (ASU), different hospitals in the Cairo metropolitan area and the well-baby clinic at the Medical Research Centre of Excellence of the National Research Centre (NRC) in the period from September 2014 to February 2015.

Inclusion criteria: Only mothers who consented to participate in the study were enrolled if their infants were over 6 months and less than 24 months old.

Exclusion criteria: Infants with specific health problems who needed special feeding programs were excluded. Infants with any obvious congenital anomalies or features of genetic diseases or if they

had a medical history of any metabolic or physical problems were also excluded.

In Egypt, the EDHS (Egypt Demographic and Health Survey) 2014 [14] shows that exclusive breastfeeding is common but not universal in very early infancy. Among infants under two months of age, 71% receiving only breast milk. However, the proportion exclusively breastfed drops off rapidly among older infants. By age 4-5 months, only 13% of children were exclusively breastfed.

By referring to tables for estimating population proportion with specified relative precision [15], it was found that: with a prevalence (P) of 13% and precision of 0.05, the table indicated that the sample size required is 196 and with a prevalence (P) of 71% and precision of 0.05, the sample size required is 316.

A total of 827 infants were recruited and classified according to the mode of feeding in the first six months into - 411 (49.7%) exclusively breastfed infants; - 311 (37.6%) artificially-fed infants; - 105 (12.7%) mixed fed infants (artificial milk and breastmilk).

A special questionnaire was designed for this study to obtain information on maternal age, maternal and paternal education and occupation, marital status, family income and childbirth order. According to the Egyptian economic scale of the family [16], the socioeconomic standard was determined.

The information obtained included parity; history of chronic diseases such as hypertension, diabetes and hypothyroidism; gestational age of the infant; mode of delivery; complications during delivery such as premature rupture of membranes, fetal distress and umbilical cord prolapse; postnatal problems such as cyanosis, jaundice and convulsions; and whether the infant was admitted to the Neonatal Intensive Care Unit (NICU).

Infant feeding practices in the first six months of life

This was the fundamental question addressed in this study; infants were classified as exclusively breastfed, artificial-fed and mixed fed.

Ethical considerations

The study, which was approved by the Medical Research Ethical Committee of NRC, complies with the International Ethical Guidelines for Biomedical Research Involving Human Subjects [17]. Informed consent was obtained from the mothers enrolled in the study.

Data were analysed with Statistical Package for the Social Sciences (SPSS) version 18. Data were summarised using descriptive statistics such as the frequency and percentage. Data were analysed using

the χ^2 -test and odds ratio [OR = (a/c)/(b/d)] [18] Multivariate logistic regression analysis was performed to predict significant factors affecting the decisions and choices regarding infant feeding in the first six months of life. Differences were considered statistically significant at P < 0.05 and highly statistically significant at P < 0.001.

Results

Table 1 shows the background variables suspected to affect exclusive breastfeeding: maternal social variables (maternal age, parity, education and occupation), maternal medical variables, prenatal and natal variables and gender of the newborn. There are 2 or 3 categories for each variable according to the characteristics of the recruited sample. The number and percentage of exclusive breastfed, artificially fed and mixed-fed infants were statistically significantly different among these categories. The majority of exclusively breastfed were males (52.5%), full-term infants (96.1%) and those who were delivered vaginally (51.3%), while the majority of artificially fed were female infants (71.1%) and those who were delivered by cesarean section (63.3%).

Table 1: General characteristics of the studied groups

Variable	Exclusive Breastfed N % 411 49.7%	Artificially Fed N % 311 37.6%	Mixed Feeding N % 105 12.7%	P Value
Sex				
Male (N = 366)	216 52.5%	90 28.9%	60 57.1%	<0.001
Female (N = 461)	195 47.5%	221 71.1%	45 42.9%	
Gestational age				
Full term (N = 768)	395 96.1%	274 88.1%	99 94.3%	0.001
Premature (N = 59)	16 3.9%	37 11.9%	6 5.7%	
Type of delivery				
Vaginal (N = 358)	211 51.3%	114 36.7%	33 31.4%	0.003
CS (N = 469)	200 48.7%	197 63.3%	72 68.6%	
Child birth order among siblings				
>3 (N = 595)	270 65.7%	253 81.4%	72 68.6%	<0.001
≤3 (N = 232)	141 34.3%	58 18.6%	33 31.4%	
Maternal age when pregnant				
≤25 (N = 322)	134 32.6%	159 51.1%	29 27.6%	<0.001
>25 (N = 505)	277 67.4%	152 48.9%	76 72.4%	
Parity				
Primipara (N = 218)	96 23.4%	92 29.6%	30 28.6%	<0.001
Multipara (N = 609)	315 76.6%	219 70.4%	75 71.4%	
Maternal education				
Illiterate (N = 196)	100 24.3%	61 19.6%	35 33.3%	<0.001
Educated (N = 631)	311 75.7%	250 80.4%	70 66.7%	
Maternal occupation				
Housewife (N = 664)	335 81.5%	259 83.3%	70 66.7%	0.001
Working (N = 163)	76 18.5%	52 16.7%	35 33.3%	
Mothers with a chronic disease (N = 163)	35 8.5%	112 36%	16 15.2%	<0.001
Mothers without a chronic disease (N = 664)	376 91.5%	199 64%	89 84.8%	

Table 2 illustrates how each social variable affected exclusive breastfeeding decision. The likelihood of artificial or mixed feeding versus exclusive breastfeeding was examined. The data indicated that infants of young (25 years or younger), primipara and single mothers, whether divorced or widowed, were more likely to be artificially fed than exclusively breastfed (OR = 2.252, P < 0.001; OR = 1.878, P < 0.001; and OR = 2.762, P = 0.008,

respectively). Also, infants of higher birth order (3rd or higher) were more likely to be artificially fed (OR = 2.436, P < 0.001). On the other hand, infants of educated and working mothers were more likely to be mixed fed than exclusively breastfed (OR = 0.435, P < 0.005; and OR = 0.453, P < 0.001). Family income had no significant effect on the probability of artificial or mixed feeding.

Table 2: Infant feeding practices about social variables

Variable	Exclusive Breastfeeding N % 411 49.7	Artificial Feeding N % 311 37.6%	Mixed Feeding N % 105 12.7
Maternal Age			
≤ 25 (N = 322)	132 32.1%	161 51.8%	29 27.6%
>25 (N = 505)	279 67.9%	150 48.2%	76 72.4%
OR (95% CI)		* 2.252 (1.662-3.053)	0.773 (0.478-1.25)
P		<0.001	0.293
Maternal Education			
Illiterate (N = 196)	120 29.2%	61 19.6%	15 14.3%
Educated (N = 631)	291 70.8%	250 80.4%	90 85.7%
OR (95% CI)		1.204 (0.779-1.86)	**0.435 (0.24-0.789)
P		0.403	0.005
Maternal Occupation			
Housewife (N = 664)	337 82%	256 82.3%	71 67.6%
Working (N = 163)	74 18%	55 17.7%	34 32.4%
OR (95% CI)		1.058 (0.711-1.576)	**0.453 (0.28-0.733)
P		0.87	0.001
Family Income			
Lower Middle (N = 377)	189 46%	145 46.6%	43 41%
Upper Middle (N = 450)	222 54%	166 53.4%	62 59%
OR (95% CI)		1.03 (0.763-1.39)	0.841 (0.545-1.297)
P		0.845	0.433
Child Birth Order			
> 3 (N = 595)	270 65.7%	251 80.7%	74 70.5%
≤ 3 (N = 232)	141 34.3%	60 19.3%	31 29.5%
OR (95% CI)		*2.436 (1.685-3.52)	1.189 (0.746-1.897)
P		<0.001	0.466
Parity			
Primipara (N = 218)	90 21.9%	105 33.8%	23 22%
Multipara (N = 609)	321 78.1%	206 66.2%	82 78%
OR (95% CI)		*1.878 (1.337-2.637)	1.197 (0.724-1.978)
P		<0.001	0.484
Marital Status			
Divorced or Widowed (N = 39)	13 3.4%	25 8%	1 1%
Married (N = 788)	398 96.8%	286 92%	104 99%
OR (95% CI)		*2.762 (1.273-5.991)	0.363 (0.046-2.864)
P		0.008	0.316

*Artificial feeding vs Exclusive Breastfeeding; ** Mixed feeding vs Exclusive Breastfeeding.

Table 3 shows that many perinatal factors affected exclusive breastfeeding decision. The likelihood of artificial or mixed feeding versus exclusive breastfeeding was examined based on these variables. Infants of mothers with a chronic disease (DM or hypertension), preterm infants and infants who experienced a complicated labor were more likely to be artificially fed than exclusively breastfed (OR = 1.721, P < 0.005; OR = 3.287, P < 0.001; and OR = 1.841, P < 0.013, respectively).

Infants born by cesarean section (CS) were 2.004-times more likely to be mixed fed (P = 0.002) and 1.429-times more likely to be artificially fed (P = 0.02) than to be exclusively breastfed. Infants admitted to the NICU for jaundice were more likely to be mixed fed than exclusively breastfed (OR = 1.925, P = 0.048), while infants admitted to the NICU for other causes were 4.073-times more likely to be artificially fed (P < 0.001) and 3.926-times more likely to be mixed fed (P < 0.001) than to be exclusively breastfed.

Table 3: Infant feeding practices about perinatal variables

Variable	Exclusive Breast Feeding N % 411 49.7	Artificial Feeding N % 311 37.6%	Mixed Feeding N % 105 12.7
Maternal chronic disease before pregnancy			
Yes (N = 163)	71 17.3%	71 22.8%	21 20%
No (N = 664)	340 82.7%	240 77.2%	84 80%
OR (95% CI)		* 1.721 (1.176-2.518)	1.345 (0.777-2.239)
P		0.005	0.288
Gestational age			
Preterm (N = 59)	19 4.6%	35 11.3%	5 4.8%
Full term (N = 768)	392 95.4%	276 88.7%	100 95.2%
OR (95% CI)		*3.287 (1.684-6.418)	1.747 (0.648-4.708)
P		<0.001	0.265
Type of delivery			
CS (N = 469)	211 51.3%	185 59.5%	73 69.5%
Vaginal (N = 358)	200 48.7%	126 40.5%	32 30.5%
OR (95% CI)		*1.429 (1.056-1.934)	**2.004 (1.28-3.137)
P		0.02	0.002
Complicated labor			
Yes (N = 104)	39 9.5%	50 16.1%	15 14.3%
No (N = 723)	372 90.5%	261 83.9%	90 85.7%
OR (95% CI)		*1.841 (1.129-3.001)	1.808 (0.942-3.47)
P		0.013	0.072
Admission to neonatal intensive care unit for jaundice			
Yes (N = 96)	41 10%	40 12.9%	15 14.3%
No (N = 731)	370 90%	271 87.1%	90 85.7%
OR (CI %)		1.411 (0.833-2.39)	**1.925 (0.997-3.715)
P		0.199	0.048
Admission to neonatal intensive care unit for other causes			
Yes (N = 93)	28 6.8%	50 16.1%	15 14.3%
No (N = 734)	383 93.2%	261 83.9%	90 85.7%
OR (CI %)		*4.073 (2.344-7.077)	**3.926 (1.98-7.785)
P		<0.001	<0.001

*Artificial feeding vs exclusive Breastfeeding; ** Mixed feeding vs exclusive Breastfeeding.

Logistic regression analysis identified the most significant factors affecting exclusive breastfeeding of mothers (Table 4).

Table 4: Logistic regression indicating factors that favour artificial feeding

	B	S.E.	Wald.	df	Sig.	Exp(B)
Maternal age	0.603	0.206	8.609	1	0.003	1.828
Maternal chronic disease	0.734	0.244	9.003	1	0.003	2.082
Gestational age	1.450	0.472	9.458	1	0.002	4.263
Type of labor	0.675	0.195	11.985	1	0.001	1.963
Marital status	1.459	0.444	10.796	1	0.001	4.301
NICU admission for causes other than jaundice	1.139	0.349	10.648	1	0.001	3.125
Constant	-6.602	1.563	17.833	1	< 0.001	0.001

Variables entered on step 1: Mother age, Mother education, child order, Maternal chronic disease, complicated labour, Gestational age, type of labour, parity, marital status, perinatal insult, NICU admission for causes other than jaundice.

Factors that influenced the preference of artificial feeding over exclusive breastfeeding included maternal age ≤ 25 years, chronic maternal disease before pregnancy, preterm delivery, CS delivery, single marital status and neonatal admission to the NICU for reasons other than jaundice.

Factors that led to the choice of mixed feeding instead of exclusive breastfeeding included maternal employment outside the home and neonatal admission to the NICU for jaundice. Non-working mothers were more likely to breastfeed their infants, as shown in Table 5.

Table 5: Logistic regression indicating factors that favour mixed feeding

	B	S.E.	Wald.	df	Sig.	Exp(B)
Complicated labour	0.623	0.349	3.176	1	0.075	1.864
Type of labour	0.507	0.240	4.459	1	0.035	1.659
Maternal occupation	-0.807	0.259	9.735	1	0.002	0.446
NICU admission for jaundice	1.391	0.376	13.718	1	<0.001	4.020
Constant	-2.242	1.036	0.031	1	0.031	0.106

Variables entered on step 1: mother education, complicated labour, delivery problems, type of labour, Maternal occupation, NICU admission for jaundice.

Discussion

Breast milk is the best gift a mother can give her baby. Currently, there is solid evidence that exclusive breastfeeding had short-term and long-term health benefits for infants and mothers [19]. Breastfeeding rates vary by region, country and culture. In this study, 52.5% of exclusively breastfed were male infants, but artificially fed were predominantly female infants (Table 1). This might be due to prevailing cultural beliefs and social standards in oriental communities, which have a bias toward males. This finding is in agreement with those of studies conducted in Ethiopia and India but not with those of studies performed in Singapore [20] [21] [22] [23]. Many factors affect exclusive breastfeeding in the first six months of life, including maternal sociodemographic traits and medical factors. The findings of this study indicate that maternal social characteristics have a significant influence on the decision of exclusive breastfeeding. **Young mothers** (25 years or younger) and first-time mothers had a higher tendency to choose artificial feeding rather than exclusive breastfeeding (OR = 2.252, $P < 0.001$; and OR = 1.878, $P < 0.001$) (Table 2). These mothers appeared to lack knowledge of the benefits of breastfeeding, or they may have misbeliefs about the effects of breastfeeding on body shape. Even after logistic regression, younger maternal age was an influential factor for artificial feeding. This finding is in agreement with the results of the study by Chudasama et al., [24] who found that young maternal age and primiparity were factors that favoured artificial feeding. The study by Girish and Gandhimathi [25] found that the exclusive breastfeeding rate among primiparous mothers was greatly affected by ignorance of the importance of breastfeeding.

In contrast to our results, Labib and El Shafei [26] reported a significantly higher percentage of exclusive breastfeeding among women in the ≤ 25 age group compared with those in an older group; they explained this finding by the fact that these younger women are eager to engage in all acts of motherhood. We found that childbirth order $> 3^{\text{rd}}$ influenced the mode of feeding toward artificial feeding rather than exclusive breastfeeding (OR = 2.436, $P < 0.001$) (table 2). We assume that mothers

preoccupied with caring for many children will find it easier to bottle-feed their infant. Also, we found that single mothers tend to choose artificial feeding (OR = 2.762, $P = 0.008$) (Table 2), which strongly suggests that mothers are in need of continuous social support to be able to breastfeed. Illiterate mothers and homemakers preferred exclusive breastfeeding rather than mixed feeding. This finding is consistent with the results of Samayam and Krishna [27], who showed that lower socioeconomic status, which is determined by maternal education and occupation, favours exclusive breastfeeding; Maternal instinct will always push a mother toward breastfeeding.

Concerning medical factors that affect exclusive breastfeeding, we found that mothers with a preterm newborn had a higher tendency toward artificial feeding than exclusive breastfeeding (OR = 3.287, $P < 0.001$) (Table 3). In our community, there is a fixed belief that preterm babies must have the most valuable nutrition, which comes from an artificial fortified source; breastfeeding is not the ideal choice for such infants. Moreover, some preterm infants are not physically or developmentally able to suckle, swallow and breathe in a coordinated manner, and the duration of the mother's stay in the hospital with them varies from one hospital to another [28].

The most common misconception that undermines successful lactation for mothers of preterm infants is that the initiation of milk expression can be delayed until an infant is stable.

To overcome this problem, collaborative efforts are needed so that neonatal physicians and nurses provide additional counselling and support to mothers of preterm newborns to ensure the early establishment of frequent milk expression [29] [30]. Gianni et al., [31] found that the percentage of exclusive breastfeeding is higher among term infants than among preterm infants. This finding was explained by an increased risk of morbidity and a longer stay in the NICU among preterm infants.

What infants admitted to the NICU for jaundice were more likely to be mixed fed than exclusively breastfed (OR = 1.925, $P = 0.048$), while infants admitted to the NICU for other causes were more likely to be artificially fed ($P < 0.001$) than to be exclusively breastfed. These findings signify the ultimate importance of direct breastfeeding in NICU as Briere et al., [32] proved in their study how this process makes the continuation of breastfeeding at home after discharge is an easy one.

We recorded that Infants born by cesarean section (CS) were more likely to be mixed fed ($P = 0.002$) and artificially fed ($P = 0.02$) than to be exclusively breastfed those results goes with Hobbs et al., [33] study which found women who delivered by CS had no intention to breastfeed or did not initiate breastfeeding. We also found that women who had complicated labour preferred artificial feeding to exclusive breastfeeding (OR = 1.841, $P = 0.013$)

(Table 3). A mother who suffers during labour may find it difficult to breastfeed her infant, and this provides an opportunity for the introduction of prelacteal to this infant. This finding was consistent with that of Onah et al., [34], who reported that mothers who experienced delivery complications were more likely to not exclusively breastfeed their infants. Yes, from our study we could clearly call for more and more Baby Friendly Initiative (BFI) accredited hospitals in our country to support breastfeeding and to give more support to those women who delivered via CS or even suffering from complicated labour.

Unfortunately, our study had the limitation of not being a community-based study and hence cannot be generalised for the entire population of Egypt. Further Research is needed on a larger scale to display the actual prevalence and duration of exclusive breastfeeding among Egyptian mothers, and to explore all possible reasons behind discontinuation of exclusive breastfeeding before the sixth month of age.

In conclusion, plans to improve the health and development of children are preferable to include the following: health education and awareness programs about the importance of exclusive breastfeeding should be directed for young and first-time mothers. Improved antenatal care to reduce perinatal and neonatal problems; and training, monitoring, and supervising community health care workers to recognise labour complications and provide support and knowledge to lactating mothers.

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