




ORIGINAL PAPER

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## Prevalence and predictive factors for exclusive breastfeeding in the first 6 months among mothers attending Primary Health Care Centers in Cairo, Egypt

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### ABSTRACT

**Introduction.** Although most organizations recommend breastfeeding for at least one year due to its well-known beneficial effects, the prevalence of exclusive breastfeeding in many developing countries was quite low.

**Aim.** To identify prevalence and predictive factors affecting exclusive breastfeeding in Primary Healthcare (PHC) Centers in Cairo, Egypt.

**Material and methods.** A cross-sectional study, among mothers attended first six months immunization sessions in three PHC Centers were selected via a convenient sample, A total sample of 180 mothers, 60 from each PHC Center, were subjected to an interview questionnaire. The questionnaire used was previously validated and pre-tested. Data collection took the period from April to August 2019. Comparison between exclusive and nonexclusive breastfeeding according to possible risk factors was done.

**Results.** The frequency of breastfeeding among the participants was 90.6%; however the total exclusive breastfeeding frequency was only 39.4%. Our logistic regression model showed that exclusive breastfeeding decreased with progressive increase in infant's age (OR 0.74), and mothers with good knowledge about proper practice of breastfeeding adhered more to exclusive breastfeeding (OR 2.51). Also, it showed that, during working hours, mothers who fed their infants other than breast milk adhered less to exclusive breastfeeding (OR 0.19).

**Conclusion.** The prevalence of exclusive breastfeeding is quite low. The predictive factors for exclusive breastfeeding are, younger infant's age, good knowledge of the mothers about proper practice of breastfeeding, and mothers insisting on breastfeeding during working hours.

**Keywords.** breastfeeding, cross sectional, infants formula, primary healthcare, risk factors

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## Introduction

Breastfeeding is the ideal method suited for the physiological and psychological needs of infants not only because breast milk has great nutritional values, but also it is clean and contains antibodies that protect the baby against many common childhood diseases, beside that it is always at the right temperature, inexpensive and nearly every mother has more than enough of this high quality food for her baby.<sup>1</sup> Breastfeeding is a challenge for health professionals, regardless of their specialization, as they have to face a demand that requires skill and sensibility, for which they are not prepared.<sup>2</sup> In Egypt, the Egyptian Demographic and Health Survey (EDHS) 2014 showed 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 of exclusively breastfed drops off rapidly among older infants. By age 4-5 months, only 13% of children were exclusively breastfed.<sup>3</sup>

Family Physicians understand the advantages of family-centered care and are well positioned to provide breastfeeding support in that context as they provide comprehensive care to the whole family.<sup>4</sup> Health professionals need to be better trained to work on promoting breastfeeding, whether by health and medical schools or by healthcare administrators, in order to consolidate multi-professional teams committed to maternal-infant health.<sup>2</sup> Post discharge primary care support for breastfeeding mothers and infants can increase breastfeeding rates and duration.<sup>4</sup> Family physicians should have the knowledge to promote, protect, and support breastfeeding as the family physicians have great role in supporting breastfeeding.<sup>4</sup> Clinicians can support post discharge breastfeeding by assessing milk production and milk transfer; evaluating an infant's latch to the breast; identifying maternal and infant anatomic variations that can lead to pain and poor infant weight gain; knowing the indications for frenotomy; and treating common breastfeeding-related infections, dermatologic conditions, engorgement, and vasospasm.<sup>4</sup> Infants who are breastfed have a decreased risk of atopic dermatitis and gastroenteritis, and have a higher IQ later in life. Additional benefits in infants have been noted in observational studies.<sup>4</sup> Maternal benefits of breastfeeding include decreased risk of breast cancer, ovarian cancer, postpartum depression, hypertension, cardiovascular disease, and type 2 diabetes mellitus.<sup>4</sup> The best way to assess milk supply is by monitoring infant weight and stool output during wellness visits. Proper positioning improves latch and reduces nipple pain. Frenotomy is controversial but may reduce pain in the short term.<sup>4</sup> Breast milk does not sufficiently resource the infants' daily necessities of definite nutrients like iron and vitamin D, and therefore complementary feeding is required.<sup>5</sup> The beneficial health effects of breastfeeding for new-born explain the national and in-

ternational supports to initiate and continue breastfeeding for all new-born.<sup>6</sup> World Health Organization 2017 (WHO) and UNICEF (2017) strongly recommending to start breastfeeding during first hour of birth for establishing breastfeeding exclusively in the initial 6 months of life and continuing breastfeeding up to 2 years of age and beyond along with complementary feeding.<sup>6</sup> Full breastfeeding is breastfeeding either exclusively or predominantly. Exclusive breastfeeding means only breast milk is allowed to be fed to the baby in addition to vitamins and medications if indicated. On the other hand, partial breastfeeding includes other feeding methods in addition to breastfeeding (i.e. bottle, cup, lact-aid) regardless of content.<sup>6,7</sup> Many of the problems associated with discontinuation of breastfeeding can be escaped by counseling and health education.<sup>7</sup> The AAF and the U.S. Preventive Services Task Force recommend primary care interventions to support breastfeeding and improve breastfeeding rates and duration.<sup>4</sup> It is important for the health professionals to consider the mother's cultural background an influence on the decision to breastfeed. However, the professionals must be willing to share their knowledge with the family and form a social network to provide support and encouragement for nursing mothers to overcome obstacles<sup>8</sup>. The members of the nursing mothers' social network, including the health professionals, are capable of interfering the decision to breastfeed, by inspiring and supporting the initiative, by transferring knowledge and cultural values, or family traditions collective with growing disinterest and discouragement, due to the burden on the nursing mother in relation to how to feed the child.<sup>9</sup>

## Aim

This study aimed at identification of prevalence and predictive factors affecting exclusive breastfeeding in Primary Health Care (PHC) Centers in Cairo, Egypt.

## Material and methods

A cross-sectional study was conducted on three PHC Centers among 97 PHC units and centers (1/3 in low socioeconomic areas, 1/3 in intermediate socioeconomic areas, and 1/3 in high socioeconomic areas) in Cairo, Egypt; Saraya Al-Koppa, El-Mhkama and Al-Matarya. Data collection was done from April to August 2019. The study population included mothers paired with their infants, were attending the first 6 months immunization sessions in three PHC centers. Infants with specific health problems who needed special feeding programs were excluded. Infants with any obvious congenital anomalies, features of genetic diseases or if they had a medical history of any metabolic errors or physical problems were also excluded.

A convenient sample was used for selecting the three Primary Health Care Centers (one representative for every socioeconomic area) and systematic random sample

for selecting participant mothers for data collection. The estimated sample size was 174 infants with their mothers (approximated to 180), thus 60 were needed from each center. As exclusive breastfeeding prevalence was 13% in the first 4-5 months, according to the most recent Egypt Demographic and Health Survey.<sup>3</sup> The official records of Cairo governorate showed that the catchment areas of the three selected PHC have yearly 25,000 newborns.<sup>10</sup> Sample size was calculated with precision 5% and 95% confidence interval specified limits. Sample size was calculated using EPIDAT version 4.2 program.

Data collection was done via questionnaire, which was adopted from questionnaire for monitoring breastfeeding mothers in baby friendly hospitals, it was translated into Arabic, for word and back translation were carried out, reviewed by committee from family medicine and paediatric departments and pre-tested before using it.<sup>11</sup> It comprises 51 main questions with some subsidiary questions investigating personal and medical characteristics of the mothers and their infants, in addition to mother's knowledge, health education and breastfeeding practice. This was conducted in the form of interview questionnaire. Standard of living was calculated and classified into high, medium and low.<sup>12</sup>

#### *Ethical considerations*

Administrative approval of the Primary Healthcare Centers, where data collection took place was obtained. Ethical approval was obtained from research Ethics Committee of Faculty of Medicine, Ain Shams University in 21.04.2019. Verbal informed consent from study participants was obtained before answering the questionnaire and the questionnaire was anonymous.

#### *Statistical analysis*

The collected data were processed and coded before being analyzed using the IBM SPSS program (Statistical Package for Social Sciences) for Windows Version 23.0. Initial comparisons between exclusive and non-exclusive breastfeeding participant mothers, according to possible risk factors, using the Student's t-test/Mann-Whitney test for continuous variables and Pearson's chi-square  $X^2$  test for categorical variables. Level of significance has been set at  $P$ -value  $> 0.05$ : Non-significant;  $P$ -value  $\leq 0.05$ : Significant;  $P$ -value  $< 0.01$ : Highly significant.

The adjusted predictive factors for Exclusive Breastfeeding were obtained by logistic regression analysis. The dependent variable was performance or no performance of exclusive breastfeeding in all the participants. All variables described previously were considered as possible candidates for the final model. The initial multivariable model construction consisted of the preliminary selection of variables using a manual purposeful selection method and a relatively high significance level (alpha approximately 0.10). Subsequently, the result-

ing model was reduced using a likelihood ratio test with a significance level of 0.05. Before accepting a final model, the interactions as well as confounding factors were evaluated. The calibration of the final model was assessed using the Hosmer and Lemeshow goodness-of-fit test, and its discrimination was assessed by the area under the receiver operator characteristic (ROC) curve.

#### **Results**

Our study showed that, the mean age of participant mothers was 29.4 years ( $SD=5$ ), ranged between 18 and 42 years, and there was no significant association between exclusivity of breastfeeding and sociodemographic data of the mothers (Table 1).

There was significant association between chronic disease of the mother and exclusivity of breastfeeding, but no significant association between it and other medical data of the mothers (Table 2).

The mean age of participant infants' is 3.7 ( $SD=1.5$ ) months, with highly significant association between increasing infants' age and nonexclusive breastfeeding, indicating that the age of the infant can influence the decision of the mother to exclusive breastfeeding. The mean infants' weight is 6.0 ( $SD=1.3$ ) kilograms with no significant association with exclusivity of breastfeeding in our study. There was no significant association between exclusivity of breastfeeding and infant's gender, order among siblings, infant maturity, admission to incubator, and incubation period (Table 3).

The study showed that, the frequency of breastfeeding among the participants was (90.6%), but the total (0-6 months) exclusive breastfeeding frequency was (39.4%), (Figure 1), and its dropping could be referred to certain predictive factors which are clearly evidenced in our study such as improper breastfeeding practice (Table 4).

As not all of mothers are aware about early initiation of breastfeeding and most of them started breastfeeding late and only 32% of the exclusively breastfeeding mothers initiate breastfeeding within the first hour after birth, beside their poor level of perception about proper baby positioning and latching. Although 100% of the exclusively breastfeeding mothers replied that they are aware that successful breastfeeding is painless but most of them are not aware about prevention and early management of it if it happened as only 18.3% of the exclusively breast feeding mothers seek medical help for painful breastfeeding. In spite of 94.4% of exclusively breastfeeding mothers know about feeding on demand, but only 57.7% of exclusively breastfeeding mothers identifies early infants cues for feeding, and very little percent of the mothers feed for 15 minutes per each feed as all of these are vital practical steps for successful breastfeeding techniques that is supposed not to be missed, added to that low awareness rate about dealing with common breastfeeding problems especially among

**Table 1.** Comparison between exclusive and non-exclusive breastfeeding regarding sociodemographic data of mother domain to be breastfeeding

Variables	Total No. 180	Exclusive breastfeeding (mother's milk only)	Non-exclusive breastfeeding	P-value	Sig. *	
	No. 71	No. 109				
Mother's age	Age in years (Mean $\pm$ SD)	29.4 $\pm$ 5	28.7 $\pm$ 4.35	29.97 $\pm$ 5.46	0.086	NS
Mother's education	Do not read or write	17 (9.4%)	7 (9.9%)	10 (9.2%)	0.36	NS
	Primary	4 (2.2%)	0 (0.0%)	4 (3.7%)		
	Preparatory	5 (2.8%)	3 (4.2%)	2 (1.8%)		
	Secondary	49 (27.2%)	20 (28.2%)	29 (26.6%)		
	University	86 (47.8%)	35 (49.3%)	51 (46.8%)		
Mother's occupation	Higher Education	19 (10.6%)	6 (8.5%)	13 (11.9%)	0.18	NS
	Housewife	52 (28.9%)	16 (22.5%)	36 (33.0%)		
Standard of living	Employee	128 (71.1%)	55 (77.5%)	73 (67.0%)	0.903	NS
	High	3 (1.7%)	1 (1.4%)	2 (1.8%)		
	Medium	152 (84.4%)	61 (85.9%)	91 (83.5%)		
Living statuses	Low	25 (13.9%)	9 (12.7%)	16 (14.7%)	0.56	NS
	Living alone	134 (74.4%)	52 (73.2%)	82 (75.2%)		
	with the family of the husband	45 (25.0%)	19 (26.8%)	26 (23.9%)		
Living with husband	with another family	1 (0.6%)	0 (0.0%)	1 (0.9%)	0.66	NS
	No	3 (1.7%)	1 (1.4%)	2 (1.8%)		
Smoking	Yes	177 (98.3%)	70 (98.6%)	107 (98.2%)	0.635	NS
	Smoker	2 (1.1%)	1 (1.4%)	1 (0.9%)		
	1	62 (34.4%)	24 (33.8%)	38 (34.9%)		
Number of children	2	54 (30.0%)	26 (36.6%)	28 (25.7%)	0.216	NS
	3	39 (21.7%)	15 (21.1%)	24 (22.0%)		
	4	16 (8.9%)	5 (7.0%)	11 (10.1%)		
	More than four	9 (5.0%)	1 (1.4%)	8 (7.3%)		

P-value > 0.05: Non-significant; P-value  $\leq$  0.05: Significant; P-value < 0.01: Highly significant

\* Chi-square test; Independent student's t-test

**Table 2.** Comparison between exclusive and non-exclusive breastfeeding regarding mothers medical data

Variables	Total no. = 180	Exclusive breastfeeding (mother's milk only)	Non-exclusive breastfeeding	P-value	Sig. *	
	No. = 71	No. = 109				
Chronic diseases of the mother	Yes	10 (5.6%)	1 (1.4%)	9 (8.3%)	0.091	NS
	No	170 (94.4%)	70 (98.6%)	100 (101.7%)		
Number of pregnancies	1	56 (31.1%)	22 (31.0%)	34 (31.2%)	0.397	NS
	2	54 (30.0%)	25 (35.2%)	29 (26.6%)		
	3	34 (18.9%)	12 (16.9%)	22 (20.2%)		
	4	20 (11.1%)	9 (12.7%)	11 (10.1%)		
	More than four	16 (8.9%)	3 (4.2%)	13 (11.9%)		
Type of delivery	Vaginal delivery	20 (11.1%)	7 (9.9%)	13 (11.9%)	0.063	NS
	Painless vaginal delivery	18 (10.0%)	13 (18.3%)	5 (4.6%)		
	Caesarean without general anesthetic	5 (2.8%)	2 (2.8%)	3 (2.8%)		
	Caesarean with general anesthetic	91 (50.6%)	33 (46.5%)	58 (53.2%)		
	Assisted vaginal delivery (ventose or forceps)	46 (25.6%)	16 (22.5%)	30 (27.5%)		
Complications during pregnancy	Yes	80 (44.4%)	30 (42.3%)	50 (45.9%)	0.633	NS
	No	100 (55.6%)	41 (57.7%)	59 (54.1%)		
Complications during delivery	Yes	10 (5.6%)	5 (7.0%)	5 (4.6%)	0.35	NS
	No	170 (94.4%)	66 (93.0%)	104 (95.4%)		
Complications after delivery	Yes	13 (7.2%)	2 (2.8%)	11 (10.1%)	0.08	NS
	No	167 (92.8%)	69 (97.3%)	98 (89.9%)		
Previous exclusive breast feeding experience	1	28 (15.6%)	15 (21.1%)	13 (11.9%)	0.096	NS
	2	19 (10.6%)	10 (14.1%)	9 (8.3%)		
	3	5 (2.8%)	3 (4.2%)	2 (1.8%)		
	4	1 (0.6%)	1 (1.4%)	0 (0.0%)		
	More than four	1 (0.6%)	0 (0.0%)	1 (0.9%)		
There is no	126 (70.0%)	42 (59.2%)	84 (77.1%)			

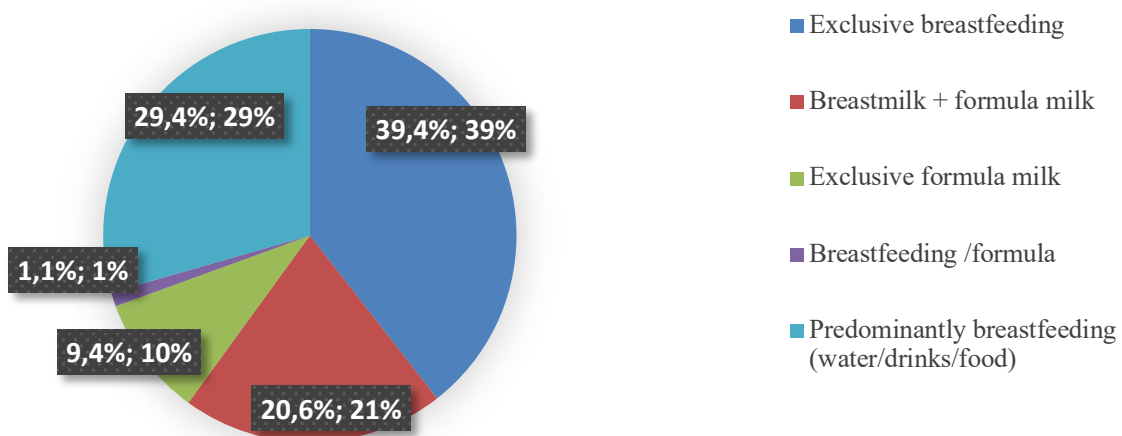
P-value > 0.05: Non-significant; P-value < 0.05: Significant; P-value < 0.01: Highly significant

\*: Chi-square test; Independent student's t-test

**Table 3.** Comparison between exclusive and non-exclusive breastfeeding regarding factors related to infant domain to be breastfed

Variables	Total no. = 180 No. = 71	Exclusive breastfeeding (mother's milk only)	Non-exclusive breastfeeding	P-value	Sig. *	
		No. = 109				
Infant age	Age in months (Mean ± SD)	3.7±1.5	3.27±1.51	4.02±1.49	0.001	S
Infant's gender	Female	97 (53.9%)	44 (62.0%)	53 (48.6%)	0.079	NS
	Male	83 (46.1%)	27 (38.0%)	56 (51.4%)		
Infant weight	Infant weight in kg	(6.0±1.3)	5.94±1.17	6.06±1.39	0.546	NS
Infant's order among other siblings	0	3 (1.7%)	0 (0.0%)	3 (2.8%)	0.22	NS
	1	65 (36.1%)	23 (32.4%)	42 (38.5%)		
	2	58 (32.2%)	29 (40.8%)	29 (26.6%)		
	3	31 (17.2%)	11 (15.5%)	20 (18.3%)		
	4	14 (7.8%)	6 (8.5%)	8 (7.3%)		
	5	6 (3.3%)	2 (2.8%)	4 (3.7%)		
	6	2 (1.1%)	0 (0.0%)	2 (1.8%)		
	7	1 (0.6%)	0 (0.0%)	1 (0.9%)		
Full term or preterm	full term	163 (90.6%)	67 (94.4%)	96 (88.1%)	0.198	NS
	Preterm	17 (9.4%)	4 (5.6%)	13 (11.9%)		
Incubated infant	Yes	21 (11.7%)	6 (8.5%)	15 (13.8%)	0.346	NS
	No	159 (88.3%)	65 (91.5%)	94 (86.2%)		
Incubation duration	Median (IQR)	1 (1–3)	1 (1–3)	1 (1–3)	0.769	NS
	Range	1–62	1–7	1–62		

\* Chi-square test; Mann-Whitney test

**Fig. 1.** Frequency of breastfeeding among total participants

mothers for the first. There was highly significant association between exclusivity of breastfeeding and infant positioning and latching during breastfeeding, with significant association as regard frequency of breastfeeding per day, but there is no significant association as regard other feeding practices (Table 4).

There was highly significant association between exclusivity of breastfeeding and employee taking their infants to work, feeding them direct breastfeeding, employee feeding formula milk or starting drinks or food to their infants during working hours, added to that no one of the employee mothers practicing milk expression (Table 5).

Our logistic regression model showed that exclusive breastfeeding decreases with progressive increase in infant's age with OR 0.74, mothers with good knowledge about proper practice of breastfeeding (e.g. infant's chin should be immersed in mother's breast and most nipple halo in the infant lower lip) adhered more to exclusive breastfeeding with OR 2.51. Our multivariate analysis showed that during working hours, mothers who fed their infants other than breast milk adhered less to exclusive breastfeeding with OR 0.19, and it is very obvious in this study, although there is high frequency of breastfeeding among our sample (Table 6).

**Table 4.** Comparison between exclusive and non-exclusive breastfeeding regarding breastfeeding practice

Variable		Total no. = 163 No. = 71	Exclusive breastfeeding	Non-exclusive	P-value	Sig.*
			(mother's milk only) No. = 92	breastfeeding		
Start breastfeeding Immediately after birth	Yes	2 (1.2%)	1 (1.4%)	1 (1.1%)	0.683	NS
Start breastfeeding within one hour of birth	Yes	44 (27.0%)	23 (32.4%)	21 (22.8%)	0.72	NS
Start breastfeeding more than one hour of birth	Yes	77 (47.2%)	36 (50.7%)	41 (44.6%)	0.436	NS
Start breastfeeding a day after birth?	Yes	36 (22.1%)	13 (18.3%)	23 (25.0%)	0.307	NS
Identify early infant cues for feeding	Yes	88 (54.0%)	41 (57.7%)	47 (51.1%)	0.398	NS
Identify intermediate infant cues for feeding	Yes	104 (63.8%)	46 (64.8%)	58 (63.0%)	0.818	NS
Identify late infant cues for feeding	Yes	147 (90.2%)	66 (93.0%)	81 (88.0%)	0.296	NS
Infant attached to mother body and belly	Yes	144 (88.3%)	69 (97.2%)	75 (81.5%)	0.002	HS
Infant chin is immersed in mothers breast and most nipple halo in the infant lower lip	Yes	132 (81.0%)	63 (88.7%)	69 (75.0%)	0.029	S
Mother nipple in the mouth of the infant	Yes	153 (93.9%)	71 (100.0%)	82 (89.1%)	0.005	HS
Not painful and swallowing	Yes	153 (93.9%)	71 (100.0%)	82 (89.1%)	0.005	HS
Correct infant position	Yes	19 (11.7%)	8 (11.3%)	11 (12.0%)	0.547	NS
Frequency of breastfeed per day	3 times	9 (5.5%)	0 (0.0%)	9 (9.8%)	0.001	S
	4 times	7 (4.3%)	2 (2.8%)	5 (5.4%)		
	5 times	2 (1.2%)	0 (0.0%)	2 (2.2%)		
	6 times	3 (1.8%)	0 (0.0%)	3 (3.3%)		
	8 times	2 (1.2%)	2 (2.8%)	0 (0.0%)		
	depending on the needs of the child	140 (85.9%)	67 (94.4%)	73 (79.3%)		
Start adding other foods with breastfeeding	Mean ± SD	2.68 ± 1.57	4.00 ± 0.00	2.65 ± 1.57	0.400	NS
	Range	1 – 5	4 – 4	1 – 6		
Reduce feeding from the painful breast	Yes	22 (13.5%)	12 (16.9%)	10 (10.9%)	0.356	NS
Little of mother milk to relive nipple pain	Yes	7 (4.3%)	5 (7.0%)	2 (2.2%)	0.241	NS
Seeking medical help for painful nipple	Yes	26 (16.0%)	13 (18.3%)	13 (14.1%)	0.47	NS
Feeds from one or both breast	From one breast	10 (6.1%)	2 (2.8%)	8 (8.7%)	0.189	NS
	From both breasts	153 (93.9%)	69 (97.2%)	84 (91.3%)		
Reasons of breast feeding from one breast	Health problems for the child	2 (1.2%)	1 (50.0%)	1 (12.5%)	0.255	NS
	Health problems for mother	4 (2.5%)	1 (50.0%)	3 (37.5%)		
	Other	4 (2.5%)	0 (0.0%)	4 (50.0%)		
Duration of breast feeding session	5 minutes	20 (12.3%)	7 (9.9%)	13 (14.1%)	0.767	NS
	10	41 (25.2%)	17 (23.9%)	24 (26.1%)		
	15	14 (8.6%)	6 (8.5%)	8 (8.7%)		
	20	2 (1.2%)	1 (1.4%)	1 (1.1%)		
	more than 20 minutes	1 (0.6%)	1 (1.4%)	0 (0.0%)		
	as your child needs	85 (52.1%)	39 (54.9%)	46 (50.0%)		

P-value > 0.05: Non-significant; P-value ≤ 0.05: Significant; P-value < 0.01: Highly significant

\* Chi-square test

**Table 5.** Comparison between exclusive and non-exclusive breastfeeding regarding breastfeeding practice among employee mothers

Variable		Total no. No. = 54	Exclusive breastfeeding	Non-exclusive	P-value	Sig.
			(mother's milk only) No. = 74	breastfeeding		
Employee taking their child to work	Yes	52 (40.6%)	51 (94.4%)	1 (1.4%)	0.000	HS
	No	76 (59.4%)	3 (5.6%)	73 (98.6%)		
Employee feeding baby directly from the breast	Yes	52 (40.6%)	51 (94.4%)	1 (1.4%)	0.000	HS
	No	76 (59.4%)	3 (5.6%)	73 (98.6%)		
Employee feeding baby formula milk	Yes	62 (48.4%)	12 (22.2%)	50 (67.6%)	0.000	HS
	No	66 (51.5%)	42 (77.8%)	24 (32.4%)		
Employee feeding baby other (mention...)	Yes	14 (10.9%)	2 (3.7%)	12 (16.2%)	0.025	S
	No	114 (89.1%)	52 (96.3%)	62 (83.8%)		

\*Not: All employee mothers are not expressing, nor storing their breast milk

**Table 6.** Predictive factors of exclusive breastfeeding in the multivariable analysis

Variable	Odds ratio	95% Confidence interval	P value
Infant's age in months	0.74	0.57 – 0.96	0.022
Mother knows that infant's chin should be immersed in mother's breast and most nipple halo in the infant lower lip	2.51	0.79 – 7.95	0.118
During working hours, mothers feed her babies other than breast or industrial milk.	0.19	0.04 – 0.94	0.041

Hosmer and Lemeshow goodness-of-fit test: 0.961.  
Discrimination (area under the receiver operating characteristics curve): 0.57.

## Discussion

This study included total number of 180 Egyptian mothers paired with their infants, were recruited from three PHC centers, their ages ranged from 18 to 42 years with a mean age of 29.4 (SD 5) years. Mother age has no association with exclusivity of breastfeeding in this study, but, another studies revealed that young mothers were non-exclusively breastfeeding their children more than older mothers.<sup>13,14</sup> In contrast, Labib and El-Shafei found increase in exclusive breastfeeding rate among women in the  $\leq 25$  age, referring it to their eagerness to be fully engaged in motherhood acts.<sup>15</sup>

About 47.8% of the mothers had university education, 71.1% of the mothers were employee with no significant association with exclusivity of breastfeeding, but another researchers found that all these social factors enhance the choice of nonexclusive breastfeeding.<sup>16</sup>

Nearly 73.9% of mothers were living in a separate house, and it showed no association with exclusivity of breastfeeding in this study. In other studies mothers-in-law and some grandmothers were supporting the mothers to feed their babies breast milk exclusively and dispirited the mother of giving pre lacteal feeds but others advised starting liquid or solid foods before six months as evidenced.<sup>17,18</sup> About 98.3% of participants have their husband with them with no association with exclusivity of breastfeeding in this study.

A previous study showed that single mothers tend to choose artificial feeding, another study reviled that most of the fathers in general are very supportive of feeding breast milk and disheartening the mother from giving formula milk and few fathers did not interfere with the mother's choice of feeding even the help given by men is low in traditional societies and usually men not fully involved in child feeding practices.<sup>13,18</sup> About 1.1% were current smoker, one third of the mothers had only one child, the mean age of participant infants was 3.27 (SD 1.5) months for exclusively fed infants and 4.02 (SD 1.491) month for nonexclusive breastfed infants with

highly significant association between higher infant's age and non-exclusivity of breastfeeding.

Most of the infants were full term (90.6%) and mean infants' weight was 5.9 (SD 1.1) kilograms for exclusive breastfed and 6.06 (SD 1.39) kilograms, for non-exclusively breastfed infants, with no association with breastfeeding exclusivity. But another study proved that incubated infants were more liable for artificial feeding than to be exclusively breastfed.<sup>8</sup> The BFHI Ten Steps are targeted to the term infant population only, so, extra and modified policies to encourage and care breastfeeding in the neonatal intensive care are desired.<sup>19</sup>

Noticeably there was high percent (50%) of cesarean sections among our sample, 70% of the mothers had no previous exclusive breastfeeding experience. Most of the mothers started breastfeeding late, no one of employee mothers expressing her breast.

There are well established international recommendations for exclusive breastfeeding for the baby's first six months of age, followed by the addition of complementary foods to be continued breastfeeding through the baby's first year, and continuation of breastfeeding for as long as desired by both mother and infant.<sup>3,6,20,21</sup> In contrary, in the present study the frequency of breastfeeding among participants was 90.6%, and the frequency of exclusive breastfeeding dropped to 39.4%, which indicates clear defect in exclusive breastfeeding among infants in their first six months of age, this could be referred to many predictive factors which were clearly evidenced in this study such as defective breastfeeding practices as proper infant positioning and latching during breastfeeding.

The study logistic regression model showed that, exclusive breastfeeding decreased with progressive increase in infant's age, while mothers with good knowledge about proper practice of breastfeeding (e.g. infant's chin should be immersed in mother's breast and most nipple halo in the infant lower lip) adhered more to exclusive breastfeeding. The study multivariate analysis showed that during working hours, mothers who fed their infants other food than breast milk adhered less to exclusive breastfeeding. This could reflect poor knowledge about the importance of breast milk in comparison of other types of infants feeding in the first 6 months of their lives.

## Study limitations

Before reaching conclusions based on the present results, it is necessary to consider a number of potential objections to the methodology. Epidemiologic studies conducted at healthcare centers are considered methodologically suspect by many investigators. Controlled clinical trials provide more evidence, but analyzing data from observational studies, case-control or cohort studies, is sometimes desirable, especially in studying the predictive factors of a practice as in our case.

## Conclusion

The prevalence of exclusive breastfeeding is quite low, a problem seen in most of developing countries. The predictive factors for exclusive breastfeeding are, younger infant's age, good knowledge of the mothers about proper practice of breastfeeding, and mothers insisting on breastfeeding during working hours.

## Recommendations

Great efforts are needed for raising exclusive breastfeeding rate via proper health education and sufficient practical training of the mothers about proper breastfeeding practice. More studies and researches are needed to investigate and clarify other causes of low exclusive breastfeeding rate. All Egyptian organizations and institutions involved in child health and wellbeing should collaborate to support breastfeeding through the following actions:

1. Research Investment to support the progress of targeted evidence-based strategies for social and behavioral change.
2. Professional and public education to resolve the actual obstacles to breastfeeding exclusively and successfully.
3. Strengthening of systems and policies which help working mothers to breastfeed their infants exclusively up to 6 months of age, via supplying mothers with enough support
4. Enough training and targeted supervision to reconstruction the health workers capacity for proper maternal and family support and counseling.
5. Building successful model of baby friendly environment and breastfeeding support groups in different health facilities in Egypt and should work towards national implementation of international guidelines and recommendations supporting proper breastfeeding.

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