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Risk Factors Associated with Initiation of Breastfeeding among Mothers with Low Birth Weight Babies: A Cross-sectional Multicenter Study in Abu Dhabi, United Arab Emirates

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Abstract

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BACKGROUND: Early initiation of breastfeeding is important for good lactation outcomes and has long been recommended by the World Health Organization. Recommendations are based on research showing that breastfeeding saves children's lives, particularly among vulnerable populations such as low birth weight (LBW) neonates. In spite of a consistent rise in LBW deliveries, and in spite of the importance of breastfeeding for the survival of LBW neonates, a dearth of research exists regarding early initiation of breastfeeding for this population.

AIM: The aim of this study was to investigate the prevalence of, and factors associated with the initiation of breastfeeding among mothers with children aged <2 years who were LBW in Abu Dhabi, United Arab Emirates (UAE).

METHODS: The data for this cross-sectional study were extracted from a larger project on the evaluation of breastfeeding practices in Abu Dhabi. The original data were collected from seven health-care centers located in different urban and suburban areas of Abu Dhabi during 2017. A structured questionnaire was used by trained research assistants who collected relevant data from mothers during the interview.

RESULTS: The study included a total of 1822 mothers of children below the age of 2 years; 175 (9.6%) of those children were identified as LBW. The mean standard deviation [SD] ages of the mothers and the children were 30.5 (5.0) years and 6.0 (5.1) months, respectively. The mean birth weight (SD) of the LBW children was 2079.6 (255.0) grams. Forty (29.9%) mothers of LBW children initiated breastfeeding within the 1st h. Sixty-four (47.8%) were delivered vaginally, and 70 (52.2%) were delivered through cesarean section (CS). In multivariable logistic regression analysis, the only factor associated with delayed initiation of breastfeeding among the LBW children was CS (adjusted odds ratio 2.33; 95% confidence interval 1.07, 5.07).

CONCLUSION: The prevalence of LBW was 9.6%, and it was associated with delayed initiation of breastfeeding as compared to the normal birth weight babies. While early initiation of breastfeeding should be promoted for all newborns, LBW infants are recognized as a vulnerable group and thus require additional support. There should be more emphasis on promoting and facilitating breastfeeding for LBW babies, especially those delivered by CS.

Background

The World Health Organization (WHO) has estimated that more than 20 million low birth weight (LBW) infants are born annually [1]. These LBW infants are at increased risk of several health problems such as growth retardation, infectious diseases, and developmental delay during infancy, childhood, and/or later stages of life [2].

There is sufficient evidence to show the benefits of early breastfeeding initiation within the 1st h of life to reduce the risk of neonatal morbidity and mortality in comparison to delayed breastfeeding [3], [4]. This simple intervention of early breastfeeding initiation is of greater significance when LBW infants are considered, as these infants are at increased risk of early growth retardation, infectious disease, developmental delay, and death during infancy and childhood in view of the increased risks described above [1].

Therefore, the WHO has set a target 30% reduction in the number of infants born with LBW by the year 2025 [1]. To achieve this, it is necessary first to estimate the prevalence of LBW and second to investigate the patterns of breastfeeding among this population.

According to UNICEF country estimates, the prevalence of LBW in the United Arab Emirates (UAE) was 6% in 2012 [5]. The factors affecting birth weight in the UAE, as revealed by the report, include closely spaced multiple pregnancies beginning at an early age, childbearing into the mothers' 40's, high rates of gestational diabetes, and high prevalence of maternal anemia [5]. Updated information on LBW in the UAE is crucial for effective policy planning.

Mothers of LBW and preterm babies produce milk that has sufficient amounts of specific nutrients needed for their growth, particularly essential amino acids that are customized for the infants' nutritional requirements [6]. Therefore, the most spectacular and remarkable health

benefits related to breastfeeding would likely be among the LBW and premature infants. Furthermore, breast milk is superior to formula feeding and, in premature infants, has been linked to better gastrointestinal, immunological, and psychological development [7]. Breast milk fulfills all the nutritional requirements of infants during the first 6 months of life [8], and its benefits extend to provide protection against diarrheal diseases, common childhood illnesses, and malnutrition, including both obesity and undernutrition [9].

The UAE Ministry of Health and all other health authorities focus on the promotion and support of breastfeeding. Various policy initiatives, including the Innocenti Declaration (1990), the Baby-Friendly Hospital Initiative (1991), and the Global Strategy for Infant and Young Child Feeding (2002), have been adopted by the UAE to improve breastfeeding outcomes [10]. Although the incidence of LBW babies continues to be high, there is insufficient data on breastfeeding patterns for this group within the existing literature. A previous study in the UAE which surveyed 1088 women, including both Emiratis and expatriates, found that almost 70% of pregnant women in the UAE suffered from Vitamin D deficiency, which is considered a risk factor for poor pregnancy outcomes such as LBW babies [11]. Accordingly, the WHO recommends that LBW infants who are able to breastfeed should be put to the breast as soon as possible after birth and when clinically stable and should be exclusively breastfed until 6 months of age [2].

Despite the full awareness of its importance, achieving the early initiation of breastfeeding for LBW and preterm newborns can be a great challenge. Several obstacles to the practice have been reported in the literature, of which the most evident are physiological limitations. Maturation to suck and swallow is only achieved in the period between the 32nd and 35th weeks of gestation, which complicates the determination of an ideal time to initiate breastfeeding for preterm newborns [12], [13]. In addition to its effects on the nutritive sucking process; prematurity can also be associated with neurological deficits [14].

There is limited data on the initiation of breastfeeding for LBW infants in the UAE. Thus, the aim of this study was to investigate the prevalence of breastfeeding and the factors associated with its initiation among mothers with LBW children aged <2 years in Abu Dhabi.

Methods

Participants and data collection

The subsample analyzed for this study was extracted from a cross-sectional study, where the

sample was mainly recruited from the community as well as from seven governmental maternal and child health centers located in different geographical areas of Abu Dhabi. A total of 1578 Emirati and non-Emirati mothers with young children attending the centers during the study days and another 267 mothers from the community were approached by trained bilingual (Arabic and English) female research assistants during the period from March 2017 to September 2017. A total of 1822 consenting mothers who met the inclusion criteria of having at least one child <2 years of age were interviewed by research assistants using a structured questionnaire. The subsample from the original large study that was considered for the analysis for the current study contained 175 subjects, larger than the sample size of a previous study conducted in Abu Dhabi [5].

Study instrument

A pre-tested questionnaire including family demographics (e.g. education, age, nationality, and occupation), infant information (e.g., birth weight and height, and mode of delivery), and infant feeding practices (e.g. initiation of breastfeeding and exclusive breastfeeding) was administered to all participants. More details regarding the methodology used for the analysis of the primary data set have been described in the previous study [15].

Study inclusion and exclusion criteria

From the original sample of 1822 mothers, data were extracted based on the following criteria: Mothers whose babies were born with birth weight <2500 g, gestational age (≥ 33 weeks), and who had completed all questions regarding breastfeeding and its initiation (i.e., mothers with missing data were excluded from the study). Infants with a birth weight of <1000 g (extreme LBW) were excluded because of the assumption that medical complications would have significantly interfered with the early initiation of breastfeeding [2].

Statistical analysis

LBW cases were sorted ($n = 175$) from the total data using Excel. One hundred and thirty-four children were included based on the inclusion criteria for this study, and the data were transferred into Statistical Package for the Social Sciences (SPSS Statistics for Windows, Version 20.0. NY: IBM Corp.). T-test and Chi-square tests were applied to analyze continuous and categorical data, respectively. To control the confounding variables, any variables with significant p-value (< 0.20) in univariate analysis were entered in multivariable logistic analysis with initiation of breastfeeding (early initiation coded as 0 and delayed initiation coded as 1) as the dependent variable. Other variables such as age, gestational age, child's gender, mode of delivery,

and occupation were set as the independent variables. Odds ratio (OR), adjusted odds ratio (AOR), and 95% confidence interval (CI) were calculated. Statistical significance was set at $p < 0.05$. Results were displayed using means (standard deviation [SD]) for continuous variables, while frequencies and percentages were used to describe categorical variables to interpret participants' responses.

Definitions

- LBW: In accordance with the WHO criteria, a birth weight of <2500 g [1]
- Gestational age: A measure of the age of a pregnancy in weeks that is taken from the beginning of the woman's last menstrual period
- Term birth: It is the birth of a baby at ≥ 37 weeks GA
- Preterm birth: It is the birth of a baby at <37 weeks GA
- Early initiation of breastfeeding: Breastfeeding initiated within 1 h after birth
- Delayed initiation of breastfeeding: Breastfeeding initiated within more than 1 h after birth
- Breastfeeding advice and/or discussion: Positive or negative information about breastfeeding received before or after delivery
- Arab nationality: Included all Emirati mothers and other Arab nationalities
- Non-Arab nationality: Included Asian mothers and other nationalities
- Family income: It was rated based on the mother answer to the following question, "Considering your monthly family income, how would you rate your and your family's overall financial well-being?" $<$ good or \geq good.

Results

One hundred and seventy-five (9.6%) of the 1822 infants in the original sample were categorized as LBW, and, of those, 134 mother-child dyads were included in this study based on the above-mentioned criteria.

The mean (SD) ages of the mothers and the children were 30.5 (5.0) years and 6.0 (5.1) months, respectively. The mothers' ages ranged from 19 to 44 years; 2 (1.5%) of them were ≤ 20 years and 33 (24.6%) of them were ≥ 35 years.

The mean (SD) birth weight was 2079.6 (255.0) grams; the birth weights ranged from 1000 to 2450 grams. Of the total 134 mothers, only one was unmarried (i.e., widowed or divorced).

Forty (29.9%) mothers reported early initiation of breastfeeding (within 1 h); the remaining 94 (70.1%)

mothers reported initiation of breastfeeding after at least 1 h.

Of the 134 mothers, 64 (47.8%) delivered vaginally and 70 (52.2%) by cesarean section (CS). However, the parent education level was not significantly associated with breastfeeding initiation; paternal was more educated than their counterpart (only one father had less than secondary education level in compared to four mothers). Eleven mothers did not receive breastfeeding advice during pregnancy.

Although pre-pregnancy body mass index, and maternal occupation were not significant with initiation of breastfeeding in bivariate analysis, $p < 0.2$ (Table 1).

Table 1: Sociodemographic characteristics of mothers with low birth weight babies in Abu Dhabi, UAE

Variable	Total (n=134)	Initiation of breastfeeding		p-value
	Mean (SD)	Early (n=40) Mean (SD)	Delayed (n=94) Mean (SD)	
Maternal age, years	30.5 (5.0)	30.7 (5.3)	30.4 (4.9)	0.776
Child age, months	6.0 (5.1)	5.7 (4.9)	6.1 (5.2)	0.682
Birth order	2.0 (1.2)	2.0 (1.3)	2.0 (1.2)	0.772
Gestational age at delivery, weeks	37.9 (2.1)	38.0 (1.7)	37.8 (2.3)	0.574
Mother height, cm	160.9 (5.9)	160.7 (6.3)	161.0 (5.7)	0.783
Mother weight pre-pregnancy, kg	60.4 (9.7)	61.8 (10.2)	59.8(9.5)	0.288
Pre-pregnancy BMI, kg/m ²	23.3 (3.6)	24.0 (4.2)	23.1 (3.4)	0.179
	n (%)	n (%)	n (%)	p-value
Maternal education				
<Secondary level	4 (3.0)	2 (5.0)	2 (2.1)	0.582
\geq Secondary level	130 (97.0)	38 (95.0)	92 (97.9)	
Maternal occupation				
Unemployed	97 (72.4)	25 (62.5)	72 (76.6)	0.095
Employed	37 (27.6)	15 (37.5)	22 (23.4)	
Nationality				
Arab	85 (63.4)	28 (70.0)	57 (60.6)	0.303
Non-Arab	49 (36.6)	12 (30.0)	37 (39.4)	
Mode of delivery				
Vaginal delivery	64 (47.8)	25 (62.5)	39 (41.5)	0.026
Cesarean delivery	70 (52.2)	15 (37.5)	55 (58.5)	
Exclusive breastfeeding				
Yes	24 (17.9)	6 (15.0)	18 (19.1)	0.567
No	110 (82.1)	34 (85.0)	76 (80.9)	
Rooming in				
Yes	121 (90.3)	38 (95.0)	83 (88.3)	0.230
No	13 (9.7)	2 (5.0)	11 (11.7)	
Child gender				
Male	49 (36.6)	13 (32.5)	36 (49)	0.524
Female	85 (63.4)	27 (67.5)	58 (61.7)	
Family income				
<Good	4 (3.0)	2 (5)	2 (2.1)	0.582
\geq Good	130 (97.0)	38 (95.0)	92 (97.9)	
Gestational age at delivery				
Term	94 (70.1)	30 (75.0)	64 (68.1)	0.423
Preterm	40 (29.9)	10 (25.0)	30 (31.9)	

UAE: United Arab Emirates, SD: Standard deviation, BMI: Body mass index

In multivariable logistic regression analysis, the only factor associated with the delay of breastfeeding initiation among LBW children was CS (AOR 2.33; 95% CI 1.07, 5.07), (Table 2).

Table 2: Multivariable logistic regression analyses of factors associated with delayed initiation of breastfeeding among mothers with low birth weight babies in Abu Dhabi, UAE

Variable	Crude odds ratio (95% CI)	Adjusted odds ratio (95% CI)	p-value
Pre-pregnancy BMI, kg/m ²	0.93 (0.85, 1.03)	0.93 (0.84, 1.03)	0.148
Maternal occupation			
Employed	0.51 (0.23, 1.13)	0.55 (0.24, 1.25)	0.125
Unemployment (reference)			
Mode of delivery			
Cesarean section	2.35 (1.10, 5.03)	2.33 (1.07, 5.07)	0.033
Vaginal delivery (reference)			

UAE: United Arab Emirates, CI: Confidence interval, BMI: Body mass index

Discussion

To the best of the authors' knowledge, this is the first population-based study using data collected from different health-care centers located in urban and suburban parts of Abu Dhabi, to estimate the prevalence of LBW and assess the timing of breastfeeding among LBW infants.

The prevalence of LBW was (9.6%), which is higher than the reported prevalence in 2009 (6.1%) [16]. The rate of early initiation of breastfeeding among the group was 29.9%. Initiation of breastfeeding was more frequently delayed in the case infants delivered by CS.

Among all of the studied factors, CS delivery was the most frequent factor associated with delayed initiation of breastfeeding for LBW infants. CS is a well-documented risk factor for delayed initiation of breastfeeding both in the UAE and in many other countries [17, [18], [19], [20].

The previously documented rate for early initiation of breastfeeding in the UAE was 80.6%, reported by Radwan [19]. The rate of early initiation of breastfeeding among the total sample (1822 mother-infant dyads) of the original study from which the current subsample was extracted, was found to be lower (59.8%) [15]. When early initiation was subsequently computed for the LBW subgroup, the rate dropped even further to 29.9%.

It is worth mentioning that as an important and practical step toward supporting the survival and health of both infants and women, breastfeeding is a central part of the 2030 Agenda for Sustainable Development and is linked to many of the Sustainable Development Goals [21]. Accordingly, the American Academy of Pediatrics (AAP) Committee on Nutrition recommends breastfeeding as the optimal content and method of infant feeding for LBW premature infants in the 1st year of life [22]. The AAP's position statement is mainly based on a strong evidence-based research which indicates several nutritional, immunologic, and physiological benefits gained by those LBW infants who receive their own mothers' milk [23], [24]. As several studies support the benefits of breastfeeding for the LBW infants, we should put much emphasis on its early initiation.

Other studies showed that chances to breastfeed earlier would develop the sucking reflex of babies in which they could suck the breast milk properly and continuously [25]. In Indonesia, researchers found that the onset of lactation of more than 6 h among LBW was associated with 5 times the risk of non-optimal breastfeeding practices [26]. Hospitals should provide mothers of LBW infants support to initiate breastfeeding as early as possible.

The results of previous studies have supported the importance of early initiation of breastfeeding as one of the determinant factors in the mortality of LBW

neonates [26]. Premature birth is one of the main causes for LBW and can be expected to have a negative impact on the initiation of breastfeeding due to physiological immaturity.

In spite of the lack of statistical significance, the current study showed that the LBW infants with delayed initiation of breastfeeding in the study population were considered to be relatively immature. This may raise one further point which needs to be addressed by future research: Whether there is any difference between mothers of mature LBW infants and mothers of preterm LBW infants in their perceptions and practices regarding breastfeeding in general and its early initiation in particular.

The current study is consistent with the previous studies, which have shown that the practice of delayed initiation of breastfeeding was mainly among mothers with LBW infants [27], [28]. This may have several explanations. The lack of, or delayed initiation, may happen because of the limited knowledge and support of medical staff that babies with LBW were able to be trained to suck mother's breast milk as early as possible. Furthermore, the inadequate counseling for mothers in giving breast milk extract if their babies were unable to suck breast milk directly from their mother's breast milk.

Other studies have identified factors that could be related to the initiation of breastfeeding. Child gender [29], paternal education [18], [19], [30], rooming-in [18], [19], and breastfeeding support [31] have been reported as the main factors influencing the initiation of breastfeeding. This inconsistency with the current study findings may be attributed to the different nature of previous studies, such as inclusion of LBW infants in the index study and other limitations described in the next section. Rooming-in was reportedly associated with early initiation of breastfeeding in several previous studies conducted in the UAE [18], [19]. However, this association was not identified in the current study and possibly could be explained by the inability of the neonate to suck the mother's milk, despite the skin-to-skin contact and rooming-in. Therefore, newborns should be checked by qualified health-care professionals to determine their ability to breastfeed. The two main factors that should promptly be identified by health-care professionals are unsatisfactory health status and extreme LBW (i.e., <1000 g) [2]. If these factors are not identified as early as possible, skin-to-skin contact might be inadvisable for the newborn. However, if the recommended level of care is not available, then skin-to-skin contact might be advisable. The message here is that while skin-to-skin contact and rooming-in remain essential for breastfeeding initiation, both stability and birth weight need to be checked and taken into consideration too. A recent study recommended the consideration of safety issues for all infants who are rooming-in, including full-term babies [32].

The current results further showed that 11 mothers did not receive breastfeeding advice

during pregnancy. Several previous studies reported the significant association between breastfeeding communication channels (i.e., advice, discussion, support) and early initiation of breastfeeding [33], [34]. Another important consideration is the time factor. For example, postnatal advice on breastfeeding may be of low benefit and affect breastfeeding practices, even if it is given as early as 1-h after delivery.

Preterm newborns are generally able to suck and swallow in the period between the 32nd and 35th weeks of gestation [12], [13]. Thus, prospective mothers should be informed about early initiation of breastfeeding well ahead of time, i.e., during the first trimester or even before pregnancy.

Therefore, support from medical services for mothers during admission in hospital and after discharging, as well as the support from medical staff about lactation management, is important factors that needed to be considered for mothers of LBW babies.

Other options, such as extracting breast milk, should also be addressed well in advance and prepare potential mothers of preterm babies for breastfeeding options. Meier *et al.* reported that extracting the breast milk as early and often as possible would increase the mother's ability in practicing breastfeeding to their LBW infant [35].

In addition, the information and support provided should be evidence-based, individualized, and delivered effectively, especially for vulnerable infants [36]. In the UAE, a previous study emphasized the importance of verifying breastfeeding information obtained from non-professional sources such as family members [37]. Since preterm delivery and the accompanying risks of perinatal morbidity and LBW cannot easily be predicted, breastfeeding education should start as early as possible.

In conclusion, this study showed high rates of LBW and CS, and among LBW, delivery by CS was the main risk factor of delayed initiation of breastfeeding. Efforts for reducing the rates of LBW and CS may ultimately improve early initiation of breastfeeding, and ultimately improve chances for infant's survival.

Limitations

While this is the first study to tackle breastfeeding practices among mothers of LBW infants in the UAE, we acknowledge several limitations. First, our study was comprised of a small sample. A larger sample would have resulted in more reliable analyses and conclusions. Second, recall bias may have affected reporting in this study, since mothers had to recall events for children who were close to 2 years. Third, this study did not include morbidity participant data (both mothers and children) and mortality data about LBW children who were not included in the study (i.e., infants hospitalized who subsequently died). This could be of importance as the literature has documented a high rate of mortality among this vulnerable

group [31], [32]; therefore, the prevalence of LBW may have been underestimated in the current study.

Conclusion

The analysis of the project data revealed a higher LBW prevalence in Abu Dhabi than previously reported, and it was associated with delayed initiation of breastfeeding. Intervention strategies for reducing CS rates by limiting cesarean delivery on maternal request are needed to promote early initiation of breastfeeding, particularly for LBW infants. This will ultimately have a significant impact on their health and wellbeing. Therefore, further studies are needed to overcome the current limitations and to have a better understanding of the above-mentioned points.

In future research, it would be advisable to examine and collect data on other factors that potentially influence the initiation of breastfeeding, such as social, cultural, and psychological factors, in addition to data on the physical status of the mothers and infants.

Ethics Approval and Consent to Participate

The original study from which these data were extracted was approved (ZU17_006_F) by the Research Ethics Committee at Zayed University UAE. As the data were also collected from the health centers, another clearance was obtained from the Abu Dhabi Health Services Company. Informed consent was obtained from participants. Several measures were taken to ensure privacy and confidentiality throughout the study period by excluding personal identifiers.

Availability of Data and Materials

The data that support the findings of the current study are available from the corresponding author on request.

Authors' Contributions

ZT designed the study and recruited the participants. ZT and AAH analyzed the data and wrote

the manuscript. LS and DP contributed to the design of the study, data collection, and manuscript writing. All authors contributed, read, and approved the final manuscript.

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