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Impact of Lockdown and Visiting Restrictions for COVID-19 on Breast Milk and Short-Term Morbidities in a Tertiary Neonatal Intensive Care Unit in Türkiye

COVİD-19 Nedeniyle Sokağa Çıkma Yasakları ve Ziyaret Kısıtlamasının Türkiye'de Üçüncü Basamak Bir Yenidoğan Yoğun Bakım Ünitesinde Anne Sütü ve Kısa Dönem Morbiditeler Üzerine Etkisi

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ABSTRACT

Objective: In the COVID-19 pandemic era, visiting restrictions and lockdown measures have been leaded to serious concerns in breastfeeding and maternal-infant interaction. We aimed to evaluate the effects of visiting restrictions as no physical visits allowed period (March 13th and June 20th, 2020) on feeding with breast milk, breastfeeding and associated morbidities.

Material and Methods: Neonates admitted to neonatal intensive care unit in pre-COVID-19 pandemic and during strict visiting restrictions constituted control and study groups.

Results: Study and control groups included 197 and 193 mother-baby dyads. Study group had insignificant lower gestational age, birthweight and higher prematurity rate. Median first enteral feeding and first breast milk days were similar. First enteral feeding with breast milk was insignificantly higher in control group. Median breast milk percentage at full enteral feeding (FEF) did not differ. Median time of FEF, FEF with only breast milk and intravenous fluid duration were higher in study group (p<0.050). Full enteral feeding with breast milk during NICU stay was less in study group (78.1 vs 87%, p<0.050) while at discharge there was no difference (78.1% vs 81.3%). Feeding intolerance was insignificantly higher in study group (23.8% vs 14.6%). Median duration of NICU stay was higher in study group but not significant (13.5 vs 12 d, p>0.050).

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Ethics Committee Approval / *Etik Kurul Onayı*: This study was conducted in accordance with the Helsinki Declaration Principles. This study was approved by the ethics committee of Etlik Zübeyde Hanım Training and Research Hospital (22.06.2022, 2022/93).

Contribution of the Authors / Yazarların katkısı*: *ÇELİK İH: Constructing the hypothesis or idea of research and/or article, Planning methodology to reach the conclusions, Organizing, supervising the course of progress and taking the responsibility of the research/study, Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in logical interpretation and conclusion of the results, Taking responsibility in necessary literature review for the study, Taking responsibility in the writing of the whole or important parts of the study, Reviewing the article before submission scientifically besides spelling and grammar. ***DURUKAN TOSUN M:*** Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in logical interpretation and conclusion of the results, Taking responsibility in necessary literature review for the study. ***UZLU SE:*** Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in logical interpretation and conclusion of the results, Taking responsibility in necessary literature review for the study. ***BAŞ AY:*** Planning methodology to reach the conclusions, Organizing, supervising the course of progress and taking the responsibility of the research/study, Reviewing the article before submission scientifically besides spelling and grammar. ***DEMİREL N:*** Planning methodology to reach the conclusions, Organizing, supervising the course of progress and taking the responsibility of the research/study, Reviewing the article before submission scientifically besides spelling and grammar.

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Conclusion: No visits allowed period leaded to impaired breastfeeding, breast milk supply and associated morbidities. Parents should be informed about breastfeeding and breast milk in prenatal period, after birth and during NICU stay in COVID-19 era as before and precautions should be taken.

Key Words: Breastfeeding, Breast milk, COVID-19, Neonatal morbidities, Visiting restrictions

ÖZ

Amaç: COVİD-19 pandemi sürecinde ziyaret kısıtlamaları ve sokağa çıkma yasaklarının anne sütü ile beslenme ve anne-bebek ilişkisinde sorunlar yaratacağından endişe edildi. Bu çalışmanın amacı ülkemizde ziyaret yasağı sürecinin (13 Mart 2020-20 Haziran 2020) anne sütü ile beslenme, emzirme ve ilişkili morbiditeler üzerine etkisini değerlendirmektir.

Gereç ve Yöntemler: Yenidoğan yoğun bakım ünitesinde (YYBÜ) COVİD-19 pandemisi öncesi ve ziyaret yasağının uygulandığı dönemde yatan bebekler kontrol ve çalışma gruplarını oluşturdu.

Bulgular: Çalışma ve kontrol gruplarını 197 ve 193 anne-bebek çifti oluşturdu. Çalışma grubu daha düşük gestasyonel yaş, doğum ağırlığı ve daha yüksek prematürite oranına sahipti ancak istatistiksel anlamlı değildi. Ortanca ilk enteral beslenme ve anne sütü alma günleri benzerdi. Kontrol grubunda ilk beslenmenin anne sütü ile yapılma oranı daha fazlaydı ancak istatistiksel anlamlı değildi. Tam enteral beslenmeye geçişteki anne sütü oranı benzerdi. Ortanca tam enteral beslenmeye geçiş zamanı, tam enteral beslenmede anne sütü oranı ve intravenöz sıvı süresi çalışma grubunda daha yüksekti ($p<0.050$). Tam enteral beslenmenin anne sütü ile yapılması yatış sürecinde çalışma grubunda daha azken (78.1 ve %87, $p<0.050$) taburculuk sırasında benzerdi (%78.1 vs %81.3). Beslenme intoleransı (%23.8 vs %14.6) ve yatış süresi (13.5 ve 12 gün) çalışma grubunda daha yüksekken istatistiksel anlamlı değildi.

Sonuç: Ziyaretin yasaklanmasının emzirme, anne sütü sağlanması ve ilişkili morbiditeler üzerine olumsuz etkileri mevcuttur. Aileler COVİD-19 pandemisi öncesinde olduğu gibi anne sütü ve emzirmenin önemi hakkında gebelik süreci, doğum ve YYBÜ yatış sürecinde bilgilendirilmeli ve önlemler alınmalıdır.

Anahtar Sözcükler: Emzirme, Anne sütü, COVİD-19, Neonatal morbiditeler, Ziyaret kısıtlamaları

INTRODUCTION

COVID-19 was described as pandemic by the World Health Organization (WHO) on January 30th, 2020 that has still devastating effects on public health due to its mortality and morbidity. The first COVID-19 case was reported on March 11th, 2020 in Turkey and number of cases had been increasing. One of the first recommendations by WHO was the restriction of visitors and visiting periods in hospitals (1). This recomendation was applied firmly at the beginning of pandemic but evolved during the pandemic as different protocols in different countries even differences in the same country due to different properties of facilities (2, 3). In Turkey, restriction of visitors was applied as no physical visits allowed between March 13th and June 20th, 2020. During this period various lockdown measures affecting daily life were also taken.

Breastfeeding, breast milk recruitments, kangaroo mother care (KMC) and maternal/family bonding are some of the mainstay approaches for the short- and long-term outcomes in neonatal intensive care unit (NICU) (4). In a projection study, Minckas et al. (5) estimated that 50% reduction of KMC could result in 12.570 incremental deaths across 127 low- and middle-income countries. Separation of child and parents especially mothers were reported to be associated with decreased breastfeeding, less bonding, and worse parental relationship in the COVID-19 era (6,7). World Health Organization recommends to start exclusive breastfeeding as soon as after birth for the first 6 months and carry on to 2 years and later due to several short- and long-term benefits (8-10). Preterm infants received breast milk have less necrotizing enterocolitis (NEC), sepsis, respiratory infections, retinopathy of prematurity (ROP), and higher maternal bonding and neurocognitive scores (11,12).

In the COVID-19 pandemic era, visiting restrictions and lockdown measures have been leaded to serious concerns in breastfeeding and interaction between mothers and infants. In this study, we aimed to evaluate the effect of visiting restrictions during the lockdown on the feeding with breast milk, breastfeeding and short-term morbidities associated with feeding practices, and other neonatal morbidities.

MATERIALS and METHODS

This retrospective study was carried out in Etlik Zübeyde Hanım Training and Research Hospital NICU. Ethics committee approval was obtained from the same hospital (22.06.2022, 2022/93).

Inclusion criteria were 1) Study group: Neonates admitted to NICU during lockdown period between March 13th and June 20th, 2020. 2) Control group: Neonates admitted to NICU between October 1st, 2019, and February 1st, 2020 and discharged before lockdown period. 3) NICU stay ≥ 5 days to evaluate breast milk supply in association with visiting restrictions and the effect of discharge of mothers that is usually in 2 days after birth 4) No COVID-19 infection in mother and neonate.

The demographic and clinical characteristics were recorded from patients' medical records. We recorded gestational age (GA), birthweight (BW), prematurity (<37 week of GA), gender, maternal age, maternal or gestational disease status,

mode of delivery and being small for GA (SGA). Neonatal morbidities were defined as respiratory distress syndrome (RDS), transient tachypnea of newborn, sepsis, patent ductus arteriosus (PDA), intraventricular hemorrhage (IVH, Grade 1 to 4 according to Volpe's classification), hydrocephalus, periventricular leucomalacia, bronchopulmonary dysplasia (BPD, phototherapy, feeding intolerance (emesis, abdominal distension/tenderness, increased/no bowel sounds, increased gastric residual, color change of gastric residual, bloody stool), NEC (modified Bell's staging criteria above stage II A) (13-16). Mechanical ventilation status, medical treatment of PDA, and duration of hospitalization were also recorded. Enteral feeding status were evaluated by time and type of first enteral feeding and full enteral feeding (FEF), mother-infant stay before discharge, breast milk/formula feeding at discharge. Our study included refugee patients from mainly Syria and other countries including Iraq, Afghanistan, Pakistan, and Central Asian countries.

Before COVID-19 pandemic both mothers and fathers were allowed to visit their children daily. Skin to skin contact (SSC), KMC and breastfeeding have been started soon after birth if clinically possible and continued until discharge from NICU on a daily basis. Adjustment room stay was a routine practice before COVID-19 pandemic. Breast milk was received whenever parents bring in both periods.

During visiting restrictions, mothers were allowed to visit, breastfeed their children and perform KMC during hospital stay and parents were not allowed to visit after discharge of mother. Both mothers and fathers were informed about the importance of breast milk, how to express their breast milk, store and bring to NICU before discharge. Families were informed by phone call about the status of their children and breast milk on a daily basis, regularly. Mothers and infants without COVID-19 clinical symptoms were stayed at adjustment room before discharged for a few days if needed.

Statistical Analysis

Statistical analyses were performed using the SPSS statistical package (v. 20.0 for MAC). Categorical variables between groups were analyzed using the χ^2 test. Comparison of means between two groups was examined by using a t test, where the data fit a normal distribution, and by Mann- Whitney U test, where the data were nonnormal distributions. A p value of <0.050 was deemed to indicate statistical significance.

RESULTS

Study and control groups were consisted of 197 and 193 patients, respectively. Demographic characteristics are listed in Table I. Median GA and BW were insignificantly lower in study group (33 (23-41) vs 33 (23-41) w, p=0.050, and 1854 (480-4600) vs 1935 (525-4435) g, p>0.050, respectively). Male gender was higher in study group than control group (64% vs 53.4%, p<0.050). Control group had higher full course antenatal steroid (AS) than study group (44% vs 32%, p<0.050). Prematurity and being <32 weeks of GA rates were higher in study group but statistically insignificant (88.8% vs 82.9% and 66 (33.5%) 50 vs (25.9%), p>0.050). Other demographic characteristics such as SGA, delivery route, being refugee and maternal age were similar between groups.

Table I: Sociodemographic characteristics of patients

	Study group (n:197)	Control group (n:193)	p
Gestational week, w*	33 (23-41)	33 (23-41)	0.050
Birthweight, g*	1847 (480-4600)	1935 (525-4435)	0.33
Birthweight <2000 g†	114 (58.3)	107 (55.7)	0.60
SGA, n†	35 (17.8)	46 (23.8)	0.260
Male gender†	126 (64)	103 (53.4%)	0.030
Cesarean sectio†	162 (82.2)	157 (81.3)	0.82
APGAR at 1/5 min*	7 (0-10)/9 (1-10)	7 (2-9)/8 (4-10)	0.33/0.7
Resuscitation†	26 (13.2)	36 (18.6)	0.130
Multiple pregnancy†	43 (21.8)	35 (18.1)	0.360
Refugee†	41 (20.8)	46 (23.8)	0.470
Prematurity†	175 (88.8)	160 (82.9)	0.090
GA <32 weeks	66 (33.5)	50 (25.9)	0.100
Antenatal steroid, full course†	63 (32)	85 (44)	0.010
Maternal age*	27 (16-43)	28 (16-43)	0.48
Chorioamnionitis†	8 (4.1)	4 (2.1)	0.250

median (minimum-maximum), †:n(%), **SGA: small for gestational ag*

Clinical characteristics are listed in Table II. Respiratory distress was the main admission complaint in both groups (72.6% vs 80.3%, p>0.050). Respiratory distress syndrome, surfactant use, PDA, grade 3-4 IVH rates were similar between groups while sepsis, BPD and ROP rates were insignificantly higher in study group (p>0.050). Median first enteral feeding and first breast milk days were similar in groups (p>0.050). First enteral feeding with breast milk was insignificantly higher in control group (76.6% vs 70.9%, p>0.050). Median breast milk percentage at FEF did not differ between groups (p>0.050). Median time of FEF, FEF with breast milk and intravenous fluid duration were higher in study group (p=0.001, 0.03, 0.01, respectively). Full enteral feeding with breast milk during NICU stay was less in study group (78.1 vs 87%, p<0.050) while at discharge there was no difference (78.1% vs 81.3%, p>0.050). Feeding intolerance was higher in study group but not statistically significant (23.8% vs 14.6%, p>0.050). Necrotizing enterocolitis was diagnosed in 2 patients in each group (p>0.050). Phototherapy was given to more patients in study group but not statistically different (78.1% vs 72.4%, p>0.050) while median duration of phototherapy was similar. Mother infant stay at adjustment room rate and duration did not differ between groups (p>0.050). Median duration of NICU stay was insignificantly higher in study group (13.5 vs 12 d, p>0.050). Refugee patients in study group had less FEF

Table II: Clinical characteristic of patients

	Study group (n:197)	Control group (n:193)	p
Respiratory distress*	143 (72.6)	155 (80.3)	0.070
RDS*	89 (45)	86 (44.5)	0.220
Surfactant*	24 (12.2)	27 (14)	0.590
PDA,*	17 (8.6)	20 (10.4)	0.550
Medical treatment of PDA*	14 (7.1)	11 (5.7)	0.570
Grade 3-4 IVH*	2 (1)	1 (0.5)	100
Hydrocephalus*	1 (0.5)	2 (1)	0.620
Sepsis*	24 (12.2)	16 (8.3)	0.190
Early/late onset sepsis*	5/19 (20.8)	3/13 (18.8)	1.000
BPD*	11 (5.6)	6 (3.1)	0.220
ROP (any stage)*	17 (8.6)	10 (5.2)	0.180
ROP treatment (laser or IVB)*	3 (1.5)	1 (0.5)	0.620
First enteral feeding, day†	2 (1-4)	2 (1-4)	0.7
First enteral feeding with breastmilk*	139 (70.9)	147 (76.6)	0.20
First breastmilk, day†	2 (1-13)	2 (1-12)	0.6
Breastmilk percentage at full enteral feeding, % †	100 (0-100)	100 (0-100)	0.15
Time to reach full enteral feeding, day†	6 (2-26)	5 (2-100)	0.001
Time to reach full enteral feeding with breastmilk if possible, day†	7 (3-50)	6 (3-49)	0.03
Full enteral feeding with breastmilk during NICU stay*	153 (78.1)	168 (87)	0.020
Full enteral feeding with breastmilk at NICU discharge*	154 (78.1)	157 (81.3)	0.360
IV fluid duration, day†	6 (0-26)	5 (1-49)	0.01
Feeding intolerance*	43 (23.8)	28 (14.6)	0.060
Breastmilk/formula/both at feeding intolerance*	27/6/10	16/5/7	0.800
Feeding intolerance, day†	4 (0-42)	4 (2-14)	0.65
NEC*	2 (1)	2 (1)	100
NEC, day†	6.5 (6-7)	4.5 (4-5)	0.12
First meconium, day†	1 (1-6)	1 (1-5)	0.23
NIMV, day†	2 (0-41)	1 (0-67)	0.48
IMV, day†	0 (0-60)	0 (0-21)	0.58
Oxygen, day†	1 (0-76)	1 (0-75)	0.03
Phototherapy*	153 (78.1)	139 (72.4)	0.060
Phototherapy duration, hours†	36 (6-226)	39 (6-169)	0.8
Isoimmunisation*	24 (15.7)	22 (15.2)	0.920
Visiting days of mother†	3 (0-76)	9 (1-100)	<0.001
Adjustment room stay together†	175 (89.3)	175 (93.1)	0.190
Adjustment room stay, duration, day†	1 (1-5)	1 (1-3)	0.23
NICU stay, day†	13.5 (5-128)	12 (5-165)	0.07
Mortality*	1 (0.5)	4 (2.1)	0.210

:** *n(%),* **†:** *median (minimum-maximum,* ***RDS: *respiratory distress syndrome,* ***PDA:*** *patent ductus arteriosus,* ***BPD:*** *bronchopulmonary dysplasia,* ***IVH:*** *intraventricular hemorrhage,* ***ROP:*** *retinopathy of prematurity,* ***IVB:*** *intravitreal bevacizumab,* ***NEC:*** *necrotizing enterocolitis,* ***NIMV:*** *noninvasive mechanical ventilation,* ***IMV:*** *invasive mechanical ventilation.*

with breast milk than Turkish patients at discharge (67.5% vs 81.9%, p<0.050). In both groups, breast milk percentage at FEF was lower in refugees (p<0.050). There was no statistically difference in feeding intolerance according to being refugee in groups.

DISCUSSION

In this study we evaluated the effects of visiting restrictions and found that time of FEF, FEF with breast milk and IV fluid duration were higher in study group while rate of FEF with breast milk

during NICU stay was lower. Despite these results, rate of FEF with breast milk at NICU discharge became better than NICU stay.

In a study by Gunes et al.(17) from Turkey, they asked mothers not to bring their expressed breast milk (EBM) to NICU during the first month of lockdown and then they let EBM after informed consent. Rates of EBM in pre-COVID-19 era, first month and later were 100%, 0% and 79%, respectively (p<0.050). Their study group included infants ≥ 36 w of GA and median duration of hospitalization were 9, 10 and 10 days, respectively (p>0.050) while we found that duration of hospitalization was prolonged in lockdown period. This may be associated with our patients had lower GA, BW and higher time to FEF with breast milk and increased feeding intolerance. They evaluated the EBM rates between discharge and at the end of 1th month and found 90%, 89.1% and 75.9, respectively (p>0.050). There was no difference in demographic characteristics of patients. The most important difference of our study was to let mothers to bring their breast milk in lockdown period. Full enteral feeding with breast milk rates of study and control groups at discharge were 78.1% and 81.3% in our study and similar EBM rates were reported by Gunes et al.(17) after discharge. We also evaluated the role of being refugee on breast milk supply and found less feeding with breast milk among refugees. This may be associated with economic conditions of refugees because difficulties in public transport and job options were more prominent for refugees in lockdown period.

Yi et al. (18) evaluated the outcomes of term and near-term infants in terms of family centered care management during lockdown in China. Median duration of NICU stay for study and control groups were 4 and 3 days, respectively (p<0.050). Neonates were feed with EBW and breastfeeding rate at discharge was decreased as 6% (74% vs 80%) but not significant. In our study, we also had similar breastfeeding rates at discharge despite more preterm infants in our study. Muniraman et al. (7) evaluated parental perceptions in 6 neonatal units from United Kingdom and USA with different visiting limitations. Restrictive policies were one or two parents at the cotside with restricted visit duration and one parent at the cotside with unrestricted visit duration. Most restricted group reported that less often visiting and bonding, unable to receive updates and bring breast milk; and also mild to severe impact on breastfeeding was reported in 36% of parents. We did not evaluate bonding but less bonding in study group could be predicted because of strict visitation restriction policy. Bringing expressed breast milk was negatively affected in our study group such as Muniraman's study but at NICU discharge FEF with breast milk rate became similar with pre-COVID-19 era. This may be explained by understanding the importance of breast milk by our parents.

Breastfeeding has been negatively affected by prelabour and labour restrictions of a partner or support, visiting restrictions to NICU, decreased skin to skin contact and KMC in NICU in COVID-19 era (19). The WHO has been suggesting breastfeeding and SSC even in COVID-19 positive mother or infant from the start of pandemic (20). There are studies evaluating the association between lockdown and breastfeeding after discharge from maternity ward and found conflicting results including better or worse breastfeeding in lockdown period (21-23). These studies concluded that maternal support as face to face for breastfeeding and mental health is needed for better maternal and infant health but in COVID-19 era maternal support has become limited and mostly done by telephone or video interview. In our study group, we performed face to face support during hospital stay of mother and continued as telephone interview up to NICU discharge. We think that face to face support, SSC in the first days of life and adjustment room stay before discharge contributed the high breastfeeding rate in study group.

Visiting restrictions have been affecting breastfeeding, breast milk supply, SSC, bonding and the role of families as family integrated care; and short- and long-term effects of these changes to both newborn and mother are unknown. Neurodevelopment of the infant and maternal mental health are supposed to be negatively affected. The role of parents especially mothers have changed visitors to an integral and essential part of care provision (24). In a cross-sectional study from USA evaluating restrictions on parental presence in 277 NICUs in April, 2020 reported that both parental presence during 24 h and parental participation in round decreased significantly as 83-52% and 71-32%, respectively (25). The authors also reported that reductions of lactation medicine and/or social work support in 43% of NICUs. The risks mentioned above will be faced along with these measures if precautions are not taken.

Retrospective design of the study is one of the limitations of our study. We could not evaluate the mental health status of the mothers and breastfeeding status after discharge. Strength of the study is evaluating short term morbidities and association with breast milk feeding status in NICU because there are limited studies about these issues.

In our study, breastfeeding, breast milk supply and neonatal outcomes were impaired due to lockdown period at the beginning of pandemic. Understanding of importance of these factors by parents leaded to improvement of breast milk status at discharge. In conclusion, parents should be informed about breastfeeding in prenatal period, after birth and during NICU stay in COVID-19 era as before and precautions should be taken.

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