ORIGINAL RESEARCH

DOI: 10.5336/jcog.2022-92482

# The Relationship Between Breastfeeding and Maternal Obesity: A Clinical Trial

Elif Göknur TOPÇU[a], Mehmet ÇOK[b], Selin DİKMEN[c], Engin ÇELİK[c], İsmail ÖZDEMİR[c], Hale GÖKSEVER ÇELİK[d]

[a]Clinic of Obstetrics and Gynecology, Kaçkar State Hospital, Rize, Türkiye
[b]Clinic of Obstetrics and Gynecology, Viranşehir State Hospital, Şanlıurfa, Türkiye
[c]Department of Obstetrics and Gynecology, University of Health Sciences
İstanbul Kanuni Sultan Süleyman Health Training and Research Medical Center, İstanbul, Türkiye
[d]Department of Obstetrics and Gynecology, IVF and Endometriosis Center, Acibadem Fulya Hospital, İstanbul, Türkiye

**ABSTRACT Objective:** There are several factors in parental infant feeding decisions including intention to breastfeed which is a strong predictor of initiation and duration of breastfeeding. We aimed to investigate the association between obesity and breastfeeding performance to help further attempts in public health intercession for maternal obesity control. We also compared breastfeeding and non-breastfeeding women regarding other demographic and clinical characteristics. **Material and Methods:** This prospective cohort study was conducted between December 2019 and February 2020 in the University of Health Sciences, İstanbul Kanuni Sultan Süleyman Health Training and Research Medical Center. All postpartum patients who had delivered in the past 48 hours and were still hospitalized at our center were included. **Results:** Obese and non-obese groups were similar in terms of age, gravidity, parity, medical history, socioeconomic condition, and education level. Breastfeeding presence, frequency and duration did not show a significant difference between groups. When the breastfeeding and non-breastfeeding patients regarding were compared their clinical and demographic characteristics, there was no significant difference between the groups except for gravidity, parity, and postpartum complication. Among them, 94.4% of patients who were breastfeeding had the wish to breastfeed and 96.1% had a history of breastfeeding in their prior pregnancies. **Conclusion:** Since obesity is a variable that can affect breastfeeding performance, and can have secondary effects on breastfeeding through postpartum complications, the importance of pre-pregnancy weight and weight gain during pregnancy should be shared with patients in prenatal counseling.

**Keywords:** Breastfeeding; lactation; obesity; postpartum care

Breastfeeding has been the preferred method for a mother to feed her baby for centuries, being the most natural and convenient way. Breastfeeding provides many benefits for both the newborn and the mother herself. It has been documented that breastfeeding improves health outcomes of infants by lowering the risk of infection, obesity, sudden infant death syndrome, and diabetes mellitus.[1,2] It contains essential nutrients, amino acids, antibodies, bioactive molecules, hormones, and stem cells.[3,4] Infants' microbiome and immunity has a benefit from breastmilk.[5] As part of the World Health Organization (WHO), our national Ministry of Health has an educational program that recommends exclusive breastfeeding for the first 6 months and to continue for 2 years.[6] Mothers who breastfeed also have decreased risk for cardiovascular disease, metabolic syndrome, diabetes, and all-cause of mortality.[7-10]

It is a known fact that there are many situations that prevent breastfeeding, one of which is maternal obesity.[11] It has been reported that mothers who are obese are less likely to exclusively breastfeed and have lower intention to breastfeed.[12-14] This creates yet another challenge for physicians as the maternal obesity rate has an increasing trend. Obesity is defined as the body mass index (BMI) higher than 30 kg/m$^2$.

Recently, several studies have been conducted to prove the importance and benefits of breastfee-

**Correspondence:** Hale GÖKSEVER ÇELİK
Clinic of Obstetrics and Gynecology, Acıbadem Fulya Hospital, İstanbul, Türkiye
**E-mail:** hgoksever@yahoo.com

Peer review under responsibility of Journal of Clinical Obstetrics & Gynecology.

***Received:*** 07 Jul 2022 ***Accepted:*** 25 Nov 2022 ***Available online:*** 01 Dec 2022

2619-9467 / Copyright © 2023 by Türkiye Klinikleri. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

ding for both maternal and neonatal health and to encourage breastfeeding. In this study, we aimed to investigate the association between obesity and breastfeeding initiation performance to help further attempts in public health intercession for maternal obesity control. In almost all hospitals nationwide, we have breastfeeding counseling programs to improve the health of the mothers and their babies. Introducing mother and baby friendly institutions as part of the Breastfeeding Promotion and Baby-Friendly Health Organizations Program has increased the awareness of breastfeeding since 1991. This program aligned with the Baby-Friendly Hospital Initiative that was launched by the WHO and United Nations Children's Fund in early 1990s.[15] According to Turkish Population and Health Surveys, only breastfeeding the baby for the first 6 months has increased from 10.7% in 1998 to 40.7% in 2018.[16,17] In these surveys, we can see the ratios of babies who were breastfed in the first hour, who were given extra liquid/food in the first three days, who were breastfed only for the first 6 months, who were breastfed for 20-23 months and mean durations of breastfeeding. It gives a broad perspective on existing breastfeeding patterns and ratios of our population, although any factor that could affect breastfeeding has not been included. Since there are many internal and external factors that can affect breastfeeding initiation, we wanted to investigate its relationship between an important, growing public health problem which is obesity. We aimed to include the relationship with obesity to our breastfeeding counseling programs if there was a relationship to be found. We also compared breastfeeding and non-breastfeeding women regarding other demographic and clinical characteristics.

## MATERIAL AND METHODS

This prospective cohort study was conducted between December 2019 and February 2020 at the University of Health Sciences Kanuni Sultan Süleyman Training and Research Hospital, the largest tertiary care center in İstanbul for obstetrics and gynecology, administering around 15,000 births per year. Approval for the study was obtained from the institutional ethical committee (Taksim Training and Research Hospital Clinical Researches Ethics Committee, date: May 2, 2018, no: 105). The principles stated in the Helsinki Declaration were followed and informed consent was obtained from the participants.

All postpartum patients who had delivered in the past 48 hours and were still hospitalized at our center were included in this study. Patients who were using formula together with breastfeeding, and those who were not breastfeeding due to maternal comorbidities and/or fetal problems were excluded from the study. Patients who had missing data or inconsistent information were also excluded.

Demographic characteristics of the patients, age, gravity, parity, history of abortion, medical history, family history, socioeconomic status, education, marital status, maternal weight at birth, weight gain throughout pregnancy, waist circumference measurement, BMI, gestational age at delivery, mode of delivery, indication of cesarean section (if cesarean section was performed), complications following delivery, duration of breastfeeding, frequency of breastfeeding, desire of breastfeeding and breastfeeding history in previous pregnancies, were all recorded. All data collection was done by the authors from the patients by face-to-face interviews in the postpartum inpatient clinic, and answers were double checked by the floor-nurse dedicated for breastfeeding. If there were any inconsistencies, patients were not included in the study.

Patients were divided into two groups regarding their BMI. Women having a BMI greater than 30 $kg/m^2$ were considered as obese, while the remaining women were accepted as non-obese. All characteristics were compared among patients who were obese and those who were not.

Patients were further divided into two groups as breastfeeding or non-breastfeeding women and compared regarding their demographic and clinical characteristics.

All patients who delivered in our hospital were followed up, checked to see if they met the inclusion criteria, and if yes and accepted to be involved, provided information to the authors.

All patients who delivered and met the inclusion criteria between December 2019 and February 2020 were included in our study.

### STATISTICAL METHODS

Statistical analyses were performed with the SPSS software version 22 for Windows (Statistical Package for the Social Sciences, IBM, Chicago, IL). Means were presented with standard deviation and median values for continuous variables. Number of cases and percentages (%) were used for nominal variables. Differences in mean values and characteristics between groups were analyzed with independent sample t-test and chi-square test. $p<0.05$ was considered statistically significant.

## RESULTS

A total of 218 patients who met the eligibility criteria were included in our study. The demographic and clinical characteristics of the patients were presented in Table 1.

Mean age of our population was 29.9±5.9 years. Of this population, 77 patients (64.7%) were obese and 141 (35.5%) were not obese. The mean weight gain during pregnancy and waist circumference were 11.5±4.8 kilograms and 113.1±13.7 centimeters, respectively. Most patients delivered vaginally (59.6%) and 97% of the patients did not have a postpartum complication.

Breastfeeding was present in 213 patients (97.7%) and not in 5 patients (2.3%). Among all patients, 205 (94%) had a wish for breastfeeding while 13 (6%) did not. For the ones who were breastfeeding, the average duration of breastfeeding was 12.7±8.9 minutes. The most common breastfeeding frequency was every two hours (105, 48.1%) followed by once an hour (68, 31.1%) and every three hours (36, 16.5%). Of 154 multiparous patients, 147 (96.1%) had a history of breastfeeding during prior pregnancy, while 6 (3.9%) did not. For the ones who did have a history of breastfeeding, the average duration was 19.1±7.6 (3-36) months.

The comparison of obese and non-obese patients depending on their demographic and clinical characteristics is shown in Table 2. Both groups were similar in terms of age, gravidity, parity, medical history, socioeconomic condition, and education level. Although it was not statistically significant, non-obese patients gained less weight (11.1±4.7 kg) than obese patients (12.2±4.9 kg) (p=0.094). Breastfeeding presence, frequency and duration did not show a significant difference between groups.

Comparison of the obese and morbid obese patients regarding their clinical and demographic characteristics is shown in Table 3. Although there is no statistical difference between the two groups, we found that breastfeeding frequency and breastfeeding during previous pregnancy was lower in morbid obese population.

When compared the breastfeeding and non-breastfeeding patients regarding their clinical and demographic characteristics, no significant difference was observed between the groups except for gravidity, parity, and postpartum complication (Table 4). Primigravid and primipara patients had higher incidence of lack of breastfeeding compared to multigravid and multipara patients (p=0.003 and p=0.012, respectively). Although postpartum complication rates were found to be significantly lower in the breastfeeding group (p=0.017), there was no postpartum complication noted in 97.7% of breastfeeding patients. Among them, 94.4% of patients who were breastfeeding had the wish to breastfeed and 96.1% had a history of breastfeeding in their prior pregnancies.

## DISCUSSION

Breastfeeding is the primary and suggested method of nutrient supplementation for babies all over the world. The benefits of breastfeeding to maternal and perinatal wellbeing have been studied widely. It is well known that breast milk is up to date in terms of nutrients. Therefore, many international and national guidelines have been established to motivate breastfeeding. The Turkish Ministry of Health started the "Promotion of Breastfeeding and Baby-Friendly Healthcare Organizations Program" in 1991 that complies with the WHO aim of mothers starting breastfeeding immediately after birth. This program recommends feeding babies with only breast milk for the first 6 months, and continuing breastfeeding until the age of 2 years and beyond with appropriate foods after the 6$^{th}$ month. All hospitals with a delivery ward and/or newborn intensive care unit and primary health

**TABLE 1:** Clinical and demographic characteristics of the patients.

| Characteristics | $\bar{X}$±SD (minimum-maximum) or number (%) |
|---|---|
| Age | 29.9±5.9 |
| Body mass index (kg/m$^2$) | 28.9±4.4 (20.7-50.8) |
| Body mass index (kg/m$^2$) | |
| <30 | 141 (64.7) |
| ≥30 | 77 (35.3) |
| Gravidity | |
| Primigravid | 52 (23.9) |
| Multigravid | 166 (76.1) |
| Parity | |
| Primipara | 65 (29.4) |
| Multipara | 153 (70.6) |
| Abortus | |
| Absent | 168 (77.1) |
| Present | 50 (22.9) |
| Personal history | |
| Absent | 155 (71.1) |
| Present | 63 (28.9) |
| Family history | |
| Absent | 117 (53.7) |
| Present | 101 (46.3) |
| Socioeconomic condition | |
| Low | 69 (31.7) |
| Moderate | 139 (63.8) |
| High | 10 (4.6) |
| Education level | |
| No education | 36 (16.5) |
| Graduation from primary school | 81 (37.2) |
| Graduation from middle-high school | 84 (38.5) |
| Graduation from university | 17 (7.8) |
| Weight gain during pregnancy (kg) | 11.5±4.8 (0-31) |
| Gestational week at birth (weeks) | 39.0±2.0 |
| Birth way | |
| Vaginal birth | 130 (59.6) |
| Cesarean section | 88 (40.4) |
| Postpartum complication | |
| Absent | 212 (97.2) |
| Present | 6 (2.8) |
| Waist circumference (cm) | 113.1±13.7 (82-158) |
| Breastfeeding | |
| Absent | 5 (2.3) |
| Present | 213 (97.7) |
| Wish for breastfeeding | |
| Absent | 13 (6) |
| Present | 205 (94) |
| Breastfeeding duration (minutes) | 12.7±8.9 (0-50) |
| Breastfeeding frequency | |
| Absent | 5 (2.4) |
| Once an hour | 68 (31.1) |
| Every two hours | 105 (48.1) |
| Every three hours | 36 (16.5) |
| Every four hours | 1 (0.5) |
| Every eight hours | 1 (0.5) |
| Once a day | 2 (0.9) |
| Breastfeeding during prior pregnancy | |
| Absent | 6 (3.9) |
| Present | 147 (96.1) |
| Breastfeeding duration during prior pregnancy (months) | 19.1±7.6 (3-36) |

Data are presented as $\bar{X}$±SD or number (%); SD: Standard deviation.

care services undergo surveillance and strive to get accreditation for 5 years. With this program, breastfeeding rates have increased and still remain high.

Multiple factors can affect breastfeeding including maternal age, socioeconomic condition, education level, history of breastfeeding, desire of pregnancy, mode of delivery, education on breastfeeding and self-efficacy.[18-20] In our study, we sought primarily to investigate the correlation between maternal obesity and breastfeeding initiation.

Obesity is defined as excessive fat accumulation with a BMI over 30 by the WHO. Obesity is a significant health care concern. It can increase pregnancy complications and cause adverse pregnancy outcomes.[21] Obesity has been linked with lower intention to breastfeed, and increased interrupted breastfeeding based on previous studies.[13,22,23]

In this study, we grouped the patients as obese and non-obese to investigate the effect of sociodemographic and clinical features on breastfeeding initiation. There was no significant difference between the groups with respect to the variables of interest. A recent study suggested that women having BMI over ≥30 kg/m$^2$ were found to be less likely to intend to breastfeed compared to normal and overweight patients. However, such a difference depends on the different design that Marshall et al. evaluated women in, at the postpartum 6$^{th}$ week and 6$^{th}$ month, whereas we evaluated them immediately after delivery.[11]

Wish to breastfeed is another important topic which can be influenced by many different factors (physical, psychological, and cultural). Of our study population, 205 women (94%) had wished for breastfeeding while 13 (6%) did not. When we compared the obese group to the non-obese group, the wish for breastfeeding was found to be lower in the obese group although no significant difference was found (91% and 96%, respectively). Our findings are similar to the previous results in the literature. Consistent with our findings, a study conducted in Belgium also found out that prepregnant BMI had an effect and the intention for breastfeeding was significantly lower in the obese group.[24] In another study which was performed in the United States, obese women planned to breastfeed for substantially shorter periods when

**TABLE 2:** Comparison of the obese and non-obese patients regarding their clinical and demographic characteristics.

| Characteristics | $\bar{X}$±SD or number (%) Non-obese group (n=141) | Obese group (n=77) | p value |
|---|---|---|---|
| Age | 29.4±5.8 | 30.8±5.8 | 0.108 |
| Body mass index (kg/m²) | 26.4±2.2 | 33.5±3.8 | <0.001 |
| Gravidity | | | |
| Primigravid | 35 (24.8) | 17 (22.1) | 0.649 |
| Multigravid | 106 (75.2) | 60 (77.9) | |
| Parity | | | |
| Primipara | 45 (31.9) | 20 (24.7) | 0.262 |
| Multipara | 96 (68.1) | 7 (75.3) | |
| Abortus | | | |
| Absent | 104 (73.8) | 64 (83.1) | 0.116 |
| Present | 37 (26.2) | 13 (16.9) | |
| Personal history | | | |
| Absent | 101 (71.6) | 54 (70.1) | 0.815 |
| Present | 40 (28.4) | 23 (29.9) | |
| Family history | | | |
| Absent | 82 (58.2) | 35 (45.5) | 0.072 |
| Present | 59 (41.8) | 42 (54.5) | |
| Socioeconomic condition | | | |
| Low | 48 (34) | 21 (27.3) | 0.582 |
| Moderate | 87 (61.7) | 52 (67.5) | |
| High | 6 (4.3) | 4 (5.2) | |
| Education level | | | |
| No education | 26 (18.4) | 10 (13) | 0.235 |
| Graduation from primary school | 45 (31.9) | 36 (46.8) | |
| Graduation from middle-high school | 58 (41.1) | 26 (33.8) | |
| Graduation from university | 12 (8.5) | 5 (6.5) | |
| Weight gain during pregnancy (kg) | 11.1±4.7 | 12.2±4.9 | 0.094 |
| Gestational week at birth (weeks) | 38.6±2.1 | 39.1±1.8 | 0.587 |
| Birth way | | | |
| Vaginal birth | 90 (63.8) | 40 (51.9) | 0.087 |
| Cesarean section | 51 (36.2) | 37 (48.1) | |
| Postpartum complication | | | |
| Absent | 137 (97.2) | 75 (97.4) | 0.918 |
| Present | 4 (2.8) | 2 (2.6) | |
| Waist circumference (cm) | 110.1±15.0 | 118.4±9.0 | 0.508 |
| Breastfeeding presence | | | |
| Absent | 2 (1.4) | 3 (3.9) | 0.243 |
| Present | 139 (98.6) | 74 (96.1) | |
| Breastfeeding duration (minutes) | 12.7±9.2 | 12.7±8.4 | 0.995 |
| Breastfeeding frequency | | | |
| Absent | 2 (1.4) | 3 (3.9) | 0.388 |
| Once an hour | 43 (30.5) | 27 (35.1) | |
| Every two hours | 71 (50.3) | 32 (41.6) | |
| Every three hours | 22 (15.6) | 14 (18.2) | |
| Every four hours | 1 (0.7) | 0 | |
| Every eight hours | 0 | 1 (1.3) | |
| Once a day | 2 (1.4) | 0 | |
| Wish for breastfeeding | | | |
| Absent | 6 (4.3) | 7 (9.1) | 0.150 |
| Present | 135 (95.7) | 70 (90.9) | |
| Breastfeeding during prior pregnancy | | | |
| Absent | 3 (3.1) | 3 (5.3) | 0.510 |
| Present | 93 (96.9) | 54 (94.7) | |
| Breastfeeding duration during prior pregnancy (months) | 19.3±7.6 | 18.8±7.7 | 0.715 |

Data are presented as $\bar{X}$±SD or number (%), Used independent samples t-test or chi-square test; p<0.05 accepted as statistically significant; SD: Standard deviation.

**TABLE 3:** Comparison of the obese and morbid obese patients regarding their clinical and demographic characteristics.

| | $\bar{X}$±SD or number (%) | | |
|---|---|---|---|
| **Characteristics** | **Obese group (n=71)** | **Morbid obese group (n=6)** | **p value** |
| Age | 30.9±6.0 | 29.8±4.6 | 0.665 |
| Body mass index (kg/m$^2$) | 32.6±2.5 | 43.1±4.0 | <0.001 |
| Gravidity | | | |
| Primigravid | 14 (19.7) | 3 (50) | 0.086 |
| Multigravid | 57 (80.3) | 3 (50) | |
| Parity | | | |
| Primipara | 16 (22.5) | 3 (50) | 0.134 |
| Multipara | 55 (77.5) | 3 (50) | |
| Abortus | | | |
| Absent | 59 (83.1) | 5 (83.3) | 0.988 |
| Present | 12 (16.9) | 1 (16.7) | |
| Personal history | | | |
| Absent | 49 (69) | 5 (83.3) | 0.462 |
| Present | 22 (31) | 1 (16.7) | |
| Family history | | | |
| Absent | 32 (45.1) | 3 (50) | 0.816 |
| Present | 39 (54.9) | 3 (50) | |
| Socioeconomic condition | | | |
| Low | 19 (26.8) | 2 (33.3) | 0.808 |
| Moderate | 48 (67.6) | 4 (66.7) | |
| High | 4 (5.6) | 0 | |
| Education level | | | |
| No education | 9 (12.7) | 1 (16.7) | 0.898 |
| Graduation from primary school | 34 (47.9) | 2 (33.3) | |
| Graduation from middle-high school | 23 (32.4) | 3 (50) | |
| Graduation from university | 5 (7) | 0 | |
| Weight gain during pregnancy (kg) | 12.2±4.6 | 11.8±7.5 | 0.901 |
| Gestational week at birth (weeks) | 39.0±2.0 | 38.5±1.5 | 0.672 |
| Birth way | | | |
| Vaginal birth | 39 (54.9) | 1 (16.7) | 0.072 |
| Cesarean section | 32 (45.1) | 5 (83.3) | |
| Postpartum complication | | | |
| Absent | 69 (97.2) | 6 (100) | 0.677 |
| Present | 2 (2.8) | 0 | |
| Waist circumference (cm) | 117.2±8.5 | 130.0±4.1 | 0.005 |
| Breastfeeding presence | | | |
| Absent | 3 (4.2) | 0 | 0.608 |
| Present | 68 (95.8) | 6 (100) | |
| Breastfeeding duration (minutes) | 12.7±8.7 | 13.3±5.2 | 0.862 |
| Breastfeeding frequency | | | |
| Absent | 3 (4.2) | 0 | 0.035 |
| Once an hour | 25 (35.2) | 2 (33.3) | |
| Every two hours | 29 (40.9) | 3 (50) | |
| Every three hours | 14 (19.7) | 0 | |
| Every four hours | 0 | 0 | |
| Every eight hours | 0 | 1 (16.7) | |
| Wish for breastfeeding | | | |
| Absent | 7 (9.9) | 0 | 0.420 |
| Present | 64 (90.1) | 6 (100) | |
| Breastfeeding during prior pregnancy | | | |
| Absent | 2 (3.7) | 1 (33.3) | 0.025 |
| Present | 52 (96.3) | 2 (66.7) | |
| Breastfeeding duration during prior pregnancy (months) | 18.9±7.6 | 16.0±11.3 | 0.602 |

Data are presented as $\bar{X}$±SD or number (%), Used independent samples t-test or chi-square test; p<0.05 accepted as statistically significant; SD: Standard deviation.

**TABLE 4:** Comparison of the breastfeeding and non-breastfeeding patients regarding their clinical and demographic characteristics.

| | $\bar{X}$±SD or number (%) | | |
|---|---|---|---|
| **Characteristics** | **Non-breastfeeding group (n=5)** | **Breastfeeding group (n=213)** | **p value** |
| Age | 29.0±3.9 | 29.9±5.9 | 0.722 |
| Body mass index (kg/m$^2$) | 31.9±4.8 | 28.8±4.4 | 0.118 |
| Body mass index (kg/m$^2$) | | | |
| <30 | 2 (40) | 139 (65.3) | 0.243 |
| ≥30 | 3 (60) | 74 (34.7) | |
| Gravidity | | | |
| Primigravid | 4 (80) | 48 (22.5) | 0.003 |
| Multigravid | 1 (20) | 165 (77.5) | |
| Parity | | | |
| Primipara | 4 (80) | 61 (28.2) | 0.012 |
| Multipara | 1 (20) | 152 (71.8) | |
| Abortus | | | |
| Absent | 4 (80) | 164 (77) | 0.874 |
| Present | 1 (20) | 49 (23) | |
| Personal history | | | |
| Absent | 2 (40) | 153 (71.8) | 0.121 |
| Present | 3 (60) | 60 (28.2) | |
| Family history | | | |
| Absent | 2 (40) | 115 (54) | 0.535 |
| Present | 3 (60) | 98 (46) | |
| Socioeconomic condition | | | |
| Low | 2 (40) | 67 (31.5) | 0.836 |
| Moderate | 3 (60) | 136 (63.8) | |
| High | 0 | 10 (4.7) | |
| Education level | | | |
| No education | 0 | 36 (16.9) | 0.249 |
| Graduation from primary school | 3 (60) | 78 (36.6) | |
| Graduation from middle-high school | 2 (40) | 82 (38.5) | |
| Graduation from university | 0 | 17 (8) | |
| Weight gain during pregnancy (kg) | 14.0±4.2 | 28.8±4.4 | 0.235 |
| Gestational week at birth (weeks) | 34.0±4.3 | 39.0±2.0 | 0.066 |
| Birth way | | | |
| Vaginal birth | 2 (40) | 128 (60.1) | 0.365 |
| Cesarean section | 3 (60) | 85 (39.9) | |
| Postpartum complication | | | |
| Absent | 4 (80) | 208 (97.7) | 0.017 |
| Present | 1 (20) | 5 (2.3) | |
| Waist circumference (cm) | 119.5±4.9 | 113.0±13.7 | 0.508 |
| Wish for breastfeeding | | | |
| Absent | 1 (20) | 12 (5.6) | 0.180 |
| Present | 4 (80) | 201 (94.4) | |
| Breastfeeding during prior pregnancy | | | |
| Absent | 0 | 6 (3.9) | 0.839 |
| Present | 1 (100) | 146 (96.1) | |
| Breastfeeding duration during prior pregnancy (months) | 24 | 19.1±7.6 | 0.520 |

Data are presented as $\bar{X}$±SD or number (%), Used independent samples t-test or chi-square test; p<0.05 accepted as statistically significant; SD: Standard deviation.

compared to the non-obese population (6.9 months and 9.3 months, respectively).[25] In a systematic review, obese women were found to plan to breastfeed for a shorter period of time.[26] When analyzing the breastfeeding and non-breastfeeding women in our study, we found that 1 out of 5 women had a wish for breastfeeding in the non-breastfeeding women. These findings may result from sociodemographic differences between study populations. In our study, obese patients had lower socioeconomic condition and education levels. Similarly, in national health surveys which were done in Australia showed that reduced intention and initiation of breastfeeding are more common in patients with lower socioeconomic status.[27]

Looking at the frequency of breastfeeding, results were similar when comparing the obese group to the normal weight counterparts. Both groups had the highest number of breastfeeding frequency at once every 2 hours. In addition, the duration of breastfeeding for both groups was exactly the same (12.7 minutes). Looking at their previous pregnancies, both groups also had similar results for history of breastfeeding with a slightly higher percentage for the non-obese women than the obese group (5% vs 3%). For the participants who had a history of breastfeeding, both groups had similar duration of breastfeeding period which was approximately 19 months. In the systematic review written by Turcksin et al., obese women were found to be less likely to initiate and less likely to continue compared to the non-obese population.[26] These results were similar to a previous systematic review by Amir and Donath.[14] We think that the cultural aspects of breastfeeding might have a significant role in the permanence of breastfeeding.

Some strengths of the present study deserve to be underlined. The first one is that it has a prospective design with a large sample size, and face-to-face interviews. Additionally, almost all of the participants received their pregnancy care in our tertiary care hospital.

The limitations of our study are that not all possible factors affecting breastfeeding, such as psychological factors, could be evaluated and that breastfeeding was questioned during the hospital stay in their early postpartum period. Our study group is made of patients who were examined in their first 48 hours of postpartum period while they were hospitalized, since breastfeeding surveillance is then done by their family medicine doctors. A multidisciplinary further research is needed to follow up patients after they are discharged from the hospital to understand the breastfeeding performance in the first 6 months of postpartum. Also we had a limited number of complications in our study group. One patient was complicated with postpartum bleeding, one with isolated elevated liver enzymes and one with the hemolysis, elevated liver enzmymes, low platelet syndrome. Complications, especially postpartum bleeding, could also have an effect on breastfeeding. Further research with larger study groups are needed to evaluate the effects of pregnancy complications on lactation.

Obesity is an increasing health care problem that can affect breastfeeding performance and can have secondary effects on breastfeeding through postpartum complications. Although breastfeeding presence, frequency and duration did not show a significant difference between groups, non-obese patients gained less weight than obese patients which can lead the obese population to become morbidly obese during pregnancy. We found that breastfeeding frequency and breastfeeding during previous pregnancy was lower in morbid obese population compared to obese population. Also when compared the breastfeeding and non-breastfeeding patients, there was a significant difference between the groups for gravidity, parity, and postpartum complication. Postpartum complication rates were found to be significantly lower in the breastfeeding group. The importance of prenatal counseling about pre-pregnancy weight and weight gain during pregnancy should be understood and delivered to all patients by the health care workers.

Our study aims to show the similarities and differences of breastfeeding initiation in the normal weight, obese, and morbid obese patients. We believe our results can be used in all prenatal care and prenatal counseling settings in these populations by the health care workers.

## CONCLUSION

Obesity is a significant, increasing health care problem all over the world and the number of pre-pregnant obese patients is also increasing. Obese patients gain more weight during pregnancy than the non-obese patients and breastfeeding frequency is lower in morbid obese population than the obese population. Postpartum complication rates are found to be higher in the non-breastfeeding group. Since obesity is a variable that can affect breastfeeding performance, postpartum complication rates and the morbidity of patients, the importance of pre-pregnancy weight and weight gain during pregnancy should be shared with patients in prenatal counseling. It is important to understand the possible effect of obesity on breastfeeding, not only to have a healthier generation but also to intervene if needed. While making a personalized plan with postpartum women, it is important to assess all sociodemographic and clinical characteristics that can affect breastfeeding.

### *Acknowledgements*

*The authors would like to thank the participants of this study and Joseph Dudley Kennedy for language editing assistance.*

### *Source of Finance*

*During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.*

### *Conflict of Interest*

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

### *Authorship Contributions*

***Idea/Concept:*** *Engin Çelik, Hale Göksever Çelik;* ***Design:*** *Engin Çelik, Hale Göksever Çelik;* ***Control/Supervision:*** *Hale Göksever Çelik, İsmal Özdemir;* ***Data Collection and/or Processing:*** *Elif Göknur Topçu, Mehmet Çok, Selin Dikmen;* ***Analysis and/or Interpretation:*** *Hale Göksever Çelik;* ***Literature Review:*** *Hale Göksever Çelik, Mehmet Çok;* ***Writing the Article:*** *Elif Göknur Topçu, Selin Dikmen;* ***Critical Review:*** *Hale Göksever Çelik, İsmal Özdemir.*

## REFERENCES

1. Section on Breastfeeding. Breastfeeding and the use of human milk. Pediatrics. 2012;129(3):e827-41. [Crossref] [PubMed]
2. Kramer MS, Kakuma R. Optimal duration of exclusive breastfeeding. Cochrane Database Syst Rev. 2012;2012(8):CD003517. [Crossref] [PubMed] [PMC]
3. Lönnerdal B. Breast milk: a truly functional food. Nutrition. 2000;16(7-8):509-11. [Crossref] [PubMed]
4. Hassiotou F, Filgueira L, Trengove N, Tat Lai C, Hartmann P. Breastmilk contains primitive stem cells from the lactating breast with multi-lineage differentiation potential. Federation of American Societies for Experimental Biology. 2012;26(1):913. [Crossref]
5. Newburg DS, He Y. Neonatal gut microbiota and human milk glycans cooperate to attenuate infection and inflammation. Clin Obstet Gynecol. 2015;58(4):814-26. [Crossref] [PubMed]
6. World Health Organization. Infant and young child feding: model chapter for textbooks for medical students and allied health professionals. Geneva: World Health Organization; 2009. [Link]
7. Peters SAE, Yang L, Guo Y, Chen Y, Bian Z, Du J, et al. Breastfeeding and the risk of maternal cardiovascular disease: a prospective study of 300 000 Chinese women. J Am Heart Assoc. 2017;6(6):e006081. [PubMed] [PMC]
8. Choi SR, Kim YM, Cho MS, Kim SH, Shim YS. Association between duration of breast feeding and metabolic syndrome: the Korean National Health and Nutrition Examination Surveys. J Womens Health (Larchmt). 2017;26(4):361-7. [Crossref] [PubMed]
9. Schwarz EB, Brown JS, Creasman JM, Stuebe A, McClure CK, Van Den Eeden SK, et al. Lactation and maternal risk of type 2 diabetes: a population-based study. Am J Med. 2010;123(9):863.e1-6. Erratum in: Am J Med. 2011;124(10):e9. [Crossref] [PubMed] [PMC]
10. Bartick MC, Schwarz EB, Green BD, Jegier BJ, Reinhold AG, Colaizy TT, et al. Suboptimal breastfeeding in the United States: Maternal and pediatric health outcomes and costs. Matern Child Nutr. 2017;13(1):e12366. Erratum in: Matern Child Nutr. 2017;13(2):null. [Crossref] [PubMed] [PMC]
11. Marshall NE, Lau B, Purnell JQ, Thornburg KL. Impact of maternal obesity and breastfeeding intention on lactation intensity and duration. Matern Child Nutr. 2019;15(2):e12732. [Crossref] [PubMed] [PMC]
12. Hauff LE, Leonard SA, Rasmussen KM. Associations of maternal obesity and psychosocial factors with breastfeeding intention, initiation, and duration. Am J Clin Nutr. 2014;99(3):524-34. [Crossref] [PubMed] [PMC]
13. Thompson LA, Zhang S, Black E, Das R, Ryngaert M, Sullivan S, Roth J. The association of maternal pre-pregnancy body mass index with breastfeeding initiation. Matern Child Health J. 2013;17(10):1842-51. [Crossref] [PubMed]
14. Amir LH, Donath S. A systematic review of maternal obesity and breastfeeding intention, initiation and duration. BMC Pregnancy Childbirth. 2007;7:9. [Crossref] [PubMed] [PMC]

15. World Health Organization. Protecting, Promoting and Supporting Breastfeeding in Facilities Providing Maternity and Newborn Services. Geneva: World Health Organization; 2017. [Link]
16. Hacettepe University Institute of Population Studies. Turkey Demographic and Health Survey Main Report 1998. 1999. [Link]
17. Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü. 2018 Türkiye Nüfus ve Sağlık Arştırması. Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, T.C. Cumhurbaşkanlığı Strateji ve Bütçe Başkanlığı ve TÜBİTAK. Ankara: Elma Teknik Basım; 2019. [Link]
18. Forster DA, McLachlan HL. Breastfeeding initiation and birth setting practices: a review of the literature. J Midwifery Womens Health. 2007;52(3):273-80. [Crossref] [PubMed]
19. Hazar HU, Akça EU. Prenatal Emzirme Öz Yeterlilik Ölçeği: geçerlik ve güvenirlik çalışması [Prenatal Breastfeeding Self Efficacy Scale: validity and reliability study]. Turkish Archives of Pediatrics. 2018;53(4):222-30. [Link]
20. O'Campo P, Faden RR, Gielen AC, Wang MC. Prenatal factors associated with breastfeeding duration: recommendations for prenatal interventions. Birth. 1992;19(4):195-201. [Crossref] [PubMed]
21. Leddy MA, Power ML, Schulkin J. The impact of maternal obesity on maternal and fetal health. Rev Obstet Gynecol. 2008;1(4):170-8. [PubMed] [PMC]
22. Stuebe AM, Horton BJ, Chetwynd E, Watkins S, Grewen K, Meltzer-Brody S. Prevalence and risk factors for early, undesired weaning attributed to lactation dysfunction. J Womens Health (Larchmt). 2014;23(5):404-12. [Crossref] [PubMed] [PMC]
23. Wojcicki JM. Maternal prepregnancy body mass index and initiation and duration of breastfeeding: a review of the literature. J Womens Health (Larchmt). 2011;20(3):341-7. [Crossref] [PubMed] [PMC]
24. Guelinckx I, Devlieger R, Bogaerts A, Pauwels S, Vansant G. The effect of pre-pregnancy BMI on intention, initiation and duration of breast-feeding. Public Health Nutr. 2012;15(5):840-8. [Crossref] [PubMed]
25. Hilson JA, Rasmussen KM, Kjolhede CL. High prepregnant body mass index is associated with poor lactation outcomes among white, rural women independent of psychosocial and demographic correlates. J Hum Lact. 2004;20(1):18-29. [Crossref] [PubMed]
26. Turcksin R, Bel S, Galjaard S, Devlieger R. Maternal obesity and breastfeeding intention, initiation, intensity and duration: a systematic review. Matern Child Nutr. 2014;10(2):166-83. [Crossref] [PubMed] [PMC]
27. Amir LH, Donath SM. Socioeconomic status and rates of breastfeeding in Australia: evidence from three recent national health surveys. Med J Aust. 2008;189(5):254-6. [Crossref] [PubMed]