

The Effect of Early versus Traditional Hospital Discharge on Activities of Daily Living for Women Undergoing Elective Cesarean Section. An Observational Cohort Study

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Abstract

Background: Cesarean section is one of the most common surgeries performed worldwide and its consequences and complications represent a major public health concern. The policy of enhanced recovery after surgery has been implemented after cesarean section to optimize perioperative care. Enhanced recovery also aims to reduce the length of hospital stay, which might imply substantial healthcare savings. Rising hospital costs are one of the factors in early discharge. **Patients & Methods:** This was a prospective cohort study. 158 patients met the inclusion criteria of the study, 81 patients were discharged after 48 hours and 77 patients were discharged after 24 hours. All patients received the same postoperative care and instructions. All the study participants received a phone call 1, 3, and 5 days after discharge to objectively assess the activities of daily living through Katz index of independence in activities of daily living. All patients were offered a postpartum visit 1 week after discharge during which the wound was assessed by the Southampton wound assessment scale. Moreover, other maternal complications such as mastitis, puerperal sepsis, or pyelonephritis were assessed and cases who were readmitted were documented. Initiation of successful breastfeeding and neonatal readmission were reported as well. **Results:** 158 patients met the inclusion/exclusion criteria of the study. There was no significant difference between the two arms of the study regarding baseline characteristics. Katz index of independence showed that the resumption of activities of daily living after CS was similar in both arms of the study on days 1, 3 and 5 after discharge. Time till the passage of flatus and stool after the cesarean section was significantly shorter among the early discharge arm (9.31 VS 14.68, p value < 0.001 & 13.25 VS 24.82, p value < 0.001 respectively). Maternal readmission was not

significantly higher among the early discharge arm and at the 1-week postpartum visit, objective wound assessment by Southampton wound scoring assessment was made and there was no significant difference between the two arms of the study. Initiation of successful breastfeeding, and neonatal readmission were similar in both groups. **Conclusion:** The policy of early discharge can be adopted in low-risk cases scheduled for elective uncomplicated CS provided that the mother and the neonate are in good general condition and proper instructions regarding red flag manifestations are given.

Keywords

Cesarean Section, Early Discharge, Katz Index of Independence in Activities of Daily Living

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1. Introduction

Cesarean section (CS) is the most commonly performed surgical procedure worldwide that effectively prevents maternal and newborn mortality when used for medically indicated reasons [1]. Compared with vaginal delivery, however, the procedure is associated with a higher risk of various maternal complications, such as maternal infection and subsequent pregnancy complications, and a higher likelihood of re-hospitalization within 6 weeks of delivery. Furthermore, the likelihood of maternal morbidity increases for mothers who repeatedly undergo cesarean delivery [2]. CS typically implies a hospital stay for 2 - 3 days, whereas parous women are often discharged within a few hours after an uncomplicated vaginal birth. However, the period after CS includes recovery from surgery as well as adapting to motherhood [3].

According to World Health Organization, the CS rate will increase to 28.5% of total live births by the year 2030. This huge volume of cesarean deliveries and increasing cesarean section rate has an incremental burden on the healthcare system, leading to higher bed occupancy and financial pressure on the patients and health facilities [4]. Postpartum hospital stay is steadily declining in the UK and other countries due to cost savings. Rising hospital costs are one of the factors in early discharge [5].

According to The American College of midwifery and gynecology, earlier discharge is a choice if the baby is ready to go home, though, the mother should have basic requirements such as normal blood pressure, no symptoms of infection, and adequate pain control [5]. Also, national institute for health and care excellence (NICE) guidelines recommends “women who are recovering well, are afebrile and do not have complications following Caesarean Section should be offered early discharge (after 24 hours) from hospital and follow-up at home [6].

The aim of our study was to compare early discharge 24 hours after cesarean section with the traditional discharge at Ain Shams University Maternity Hospital which is 48 hours after the procedure regarding resumption of activities of daily living, returning of normal bowel habits, postpartum pyrexia, initiation of successful breast feeding and neonatal readmission.

2. Patients & Methods

This was a prospective cohort study that was conducted at Ain Shams University Maternity Hospital during the period from January 2022 to December 2022. All women who underwent elective lower segment cesarean section during the period of the study were prospectively identified from the hospital records and they were tested for our inclusion and exclusion criteria. Age ranging from 20 to 40 years old, BMI ≤ 35 kg/m², gestational age at delivery from 37^{0/7} to 42^{0/7} weeks of gestation, having an uncomplicated pregnancy, a cesarean section under spinal anesthesia with no intra-operative complications, and uneventful postoperative course were the inclusion criteria of the study.

Before the initiation of the study, approval of the Ethical Committee of the Faculty of Medicine, Ain Shams University (FWA 000017585) was taken with approval number MS 214/2021. Sample size justification was based on assuming an effect size of 0.8 for Katz index of independence in activities of daily living for early versus traditional hospital discharge for women undergoing elective cesarean section, a sample size of 58 patients would be enough to detect such effect with 0.8 power of the test and 0.05 alpha error.

Out of 2352 cesarean sections performed during the study period, only 158 patients met our inclusion criteria and were accepted to participate in the study; 81 patients were discharged after 48 hours and 77 patients were discharged after 24 hours. All patients received the same postoperative treatment and instructions before discharge. Informed consent was obtained from the patients before discharge and a telephone call was made to each patient 1, 3, and 5 days after discharge. These phone calls aimed to assess activities of daily living after discharge.

The primary outcome of the study was the assessment of the activities of daily living which was objectively performed through the Katz index of independence in activities of daily living. The Katz ADL measures six self-care tasks using a dichotomous rating (dependent-0/independent-1) in a hierarchical order of decreasing difficulty as listed: bathing, dressing, toileting, transferring to and from a chair, maintaining continence and feeding. Six points is considered independent and 0 points is considered fully dependent [7]; the assessment was made by a telephone call 1, 3, and 5 days after discharge. The time of regaining normal bowel habits was evaluated before discharge. Each patient was instructed to have a follow-up visit 1 week after the CS during which the wound was objectively assessed by the Southampton wound assessment scale [8] (Table 1). Moreover, any symptoms suggesting breast inflammation or puerperal sepsis were recorded at this visit. Cases who failed to initiate successful breastfeeding and those who had neonatal admission to the NICU after discharge were reported as well.

Table 1. Southampton wound scoring system [8].

| Grade | | Appearance |
|--|--|-------------------------|
| 0 | | Normal healing |
| Normal healing with mild bruising or erythema | | |
| 1 | 1A | Some bruising |
| | 1B | Considerable bruising |
| | 1C | Mild erythema |
| Erythema plus other signs of inflammation | | |
| 2 | 2A | At 1 point |
| | 2B | Around sutures |
| | 2C | Along wound |
| | 2D | Around wound |
| Clear or hemoserous discharge | | |
| 3 | At 1 point (<2 cm) | |
| | Along wound (>2 cm) | |
| | Large volume Prolonged (>3 days) | |
| Pus | | |
| 4 | A | At 1 point only (<2 cm) |
| | B | Along wound (>2 cm) |
| 5 | Deep or severe wound infection with or without tissue breakdown; hematoma requiring aspiration. | |

The collected data was revised, coded, tabulated, and introduced to a PC using the Statistical Package for Social Science (SPSS 25). Data were presented and suitable analysis was done according to the type of data obtained for each parameter. Data presentation was in terms of range, mean and standard deviation (for numerical parametric variables); and number and percentage (for categorical variables). Student T Test was used to assess the statistical significance of the difference between the two study group means and its 95% confidence interval (for numeric parametric variables). Chi-square test as well as the risk ratio and its 95% confidence interval (for categorical variables) were used. The significance level is set at 0.05. Mann Whitney Test (U test) was used to assess the statistical significance of the difference of anon-parametric variable between two study groups. Fisher's exact test: was used to examine the relationship between two qualitative variables when the expected count is less than 5 in more than 20% of cells.

3. Results

The study included 158 pregnant women who underwent scheduled elective LSCS. The age of the study participants ranged from 20 to 40 years. **Table 2**

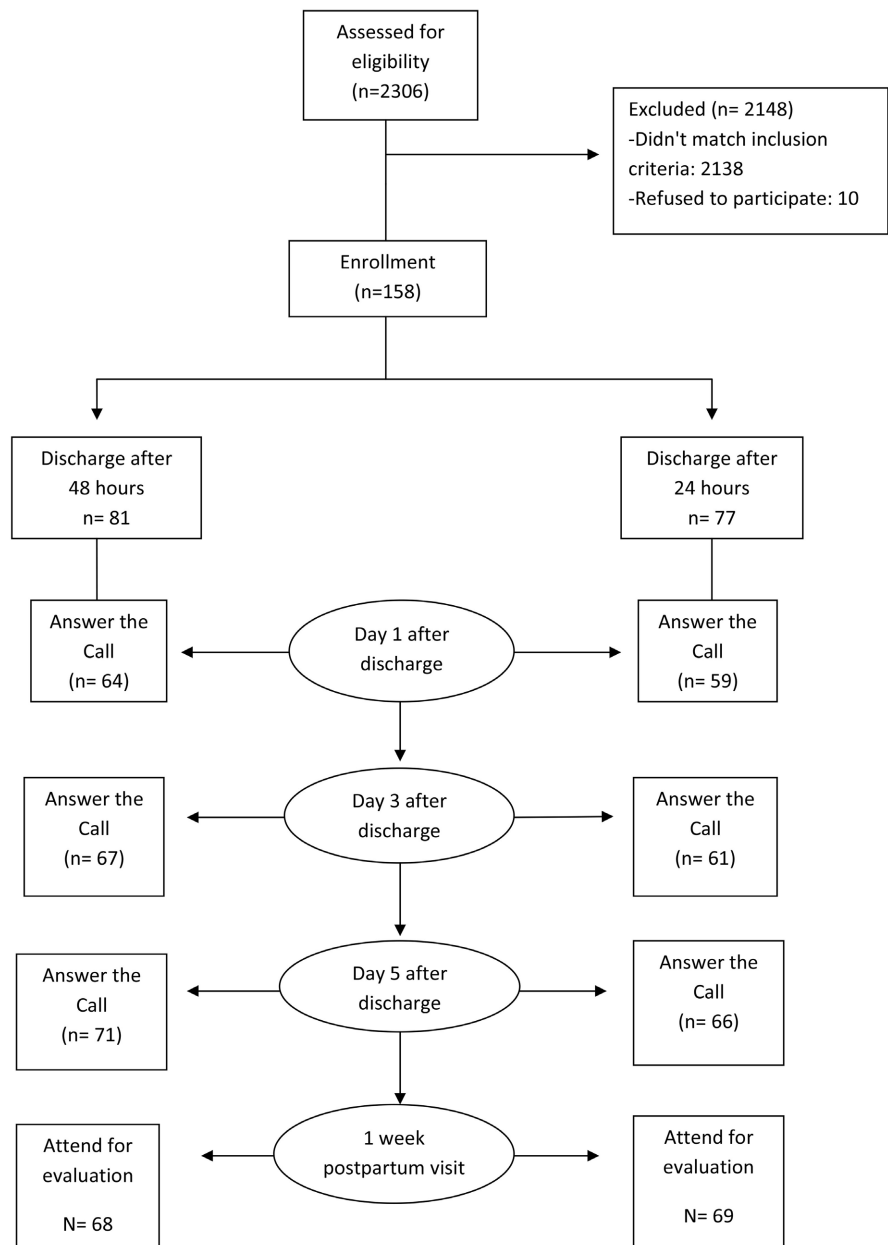


Figure 1. Flow chart of study participants.

Table 2. Comparison between the two groups regarding demographic data.

| | 24 hours (N = 77) | | 48 hours (N = 81) | | t test | |
|---------------------------------|-------------------|------|-------------------|-------|-------------------|---------|
| | Mean | SD | Mean | SD | test value | p value |
| Age (Years) | 30.42 | 5.01 | 30.53 | 5.20 | t = 0.86 | 0.390 |
| BMI (Kg/m ²) | 29.18 | 3.06 | 29.70 | 3.02 | t = -1.07 | 0.288 |
| Postoperative hemoglobin (g/dl) | 10.15 | 0.58 | 10.13 | 0.60 | t = 0.28 | 0.782 |
| | Median | IQR | Median | IQR | Mann Whitney test | |
| Parity | 2 | 1-3 | 2 | 1 - 3 | z = -0.43 | 0.665 |

SD: Standard deviation, p value > 0.05 = non-significant.

shows the baseline characteristics of the study participants. Among the study participants, 77 patients were discharged 24 hours after the CS and 81 patients were discharged after 48 hours (**Figure 1**).

The return of normal bowel habits after CS was assessed among the study participants before they were discharged; passage of flatus and stool was significantly earlier among the 24-hour arm (**Table 3**).

After discharge, a telephone call was made to each one of the study participants on day 1, day 3, and day 5 after discharge. The telephone call aimed to objectively assess the activities of daily living; the assessment was made by the KATZ index of independence in activities of daily living. On day 1, 59 out of the 77 patients (76.6%) of the early discharge arm and 64 out of the 81 patients (79.01%) of the traditional discharge arm answered the call. Regarding day 3, 61 out of 77 patients (79.2%) of the early discharge arm and 67 out of 81 patients (82.8%) of the traditional discharge arm answered the call while on day 5, 66 out of 77 patients (85.7%) of the early discharge arm and 71 out of 81 patients of the early discharge arm (87.7%) answered the call. All of the six items of the KATZ index were assessed at every call; there was no significant difference between the two arms of the study regarding neither each component nor the total score (**Table 4 & Table 5**).

A postpartum visit 1 week after discharge was offered to all study participants during which an objective assessment of the wound was performed by the Southampton wound scoring system, an assessment of the patients for postpartum complications such as mastitis, DVT, urinary tract infections, and endometritis was done, and any cases of maternal readmission were documented. Moreover, initiation of successful breastfeeding and cases of neonatal readmission were reported. 69 patients out of 77 patients (89.6%) of the early discharge arm attended the visit while 68 out of 81 patients (84%) of the traditional discharge arm attended the visit. **Table 6** showed no significant difference between the two arms of the study regarding wound condition and mastitis or breast abscess. No cases of DVT or endometritis were recorded among study participants. **Table 7** showed that the initiation of successful breastfeeding and neonatal readmission was not significantly higher among the traditional discharge arm. There was no significant difference between the two arms regarding maternal readmission in the postpartum period.

Table 3. Initial timing of regaining normal bowel habits after the cesarean section.

| | 24 hour (N: 77) | | 48 hour (N: 81) | | t test | | |
|-------------------|-----------------|------|-----------------|------|-----------------|-----------------|-------|
| | Mean | SD | Mean | SD | value | p value | |
| Passage of flatus | 9.31 | 3.17 | 14.68 | 7.26 | t = -6.08 | <0.001 | |
| passage stool | 13.25 | 3.79 | 24.82 | 8.40 | t = -10.78 | <0.001 | |
| | N | % | N | % | Chi square test | | |
| passage stool | yes | 72 | 93.5% | 74 | 91.4% | $\chi^2 = 0.26$ | 0.610 |

SD: Standard deviation, p value > 0.05 = non-significant, p value < 0.05 = significant.

Table 4. Katz index of independence in activities of daily living among study patients (each component).

| | | 24 hour | | 48 hour | | value | p value |
|--------------|-------|---------|--------|---------|--------|---------------------------------------|---------|
| | | N | % | N | % | | |
| Bathing | day 1 | 57/59 | 96.6% | 62/64 | 96.9% | Fisher exact test | 1.000 |
| | day 3 | 61/61 | 100.0% | 65/67 | 97.0% | | |
| | day 5 | 66/66 | 100.0% | 71/71 | 100.0% | | |
| Dressing | day 1 | 58/59 | 98.3% | 61/64 | 95.3% | Fisher exact test | 0.620 |
| | day 3 | 61/61 | 100.0% | 67/67 | 100.0% | | |
| | day 5 | 66/66 | 100.0% | 71/71 | 100.0% | | |
| Toileting | day 1 | 52/59 | 88.1% | 56/64 | 87.5% | $\chi^2 = 0.012$ Fisher exact test | 0.914 |
| | day 3 | 58/61 | 95.1% | 65/67 | 97.0% | | |
| | day 5 | 66/66 | 100.0% | 71/71 | 100.0% | | |
| Transferring | day 1 | 49/59 | 83.1% | 52/64 | 81.3% | $\chi^2 = 0.068$ $\chi^2 = 0.007$ | 0.795 |
| | day 3 | 54/61 | 88.5% | 59/67 | 88.1% | | |
| | day 5 | 66/66 | 100.0% | 71/71 | 100.0% | | |
| Feeding | day 1 | 58/59 | 98.3% | 63/64 | 98.4% | Fisher exact test | 1.000 |
| | day 3 | 61/61 | 100.0% | 67/67 | 100.0% | | |
| | day 5 | 66/66 | 100.0% | 71/71 | 100.0% | | |
| Continence | day 1 | 57/59 | 96.6% | 61/64 | 95.3% | Fisher exact test | 1.000 |
| | day 3 | 60/61 | 98.4% | 67/67 | 100.0% | | |
| | day 5 | 66/66 | 100.0% | 71/71 | 100.0% | | |

χ^2 : Chi square test, p value > 0.05 = non-significant.

Table 5. Katz index of independence in activities of daily living among study patients (Total score).

| | | 24 hours | | 48 hours | | Mann Whitney test | |
|---------------------------|-------|----------|-------|----------|-------|-------------------|---------|
| | | Median | IQR | Median | IQR | U | p value |
| Total score of Katz index | day 1 | 6 | 6 - 6 | 6 | 6 - 6 | 0.41 | 0.682 |
| | day 3 | 6 | 6 - 6 | 6 | 6 - 6 | | |
| | day 5 | 6 | 6 - 6 | 6 | 6 - 6 | | |

IQR: Interquartile range.

Table 6. Wound assessment among study participants using Southampton wound scale and mastitis/breast abscess among study participants.

| | | 24 hours (N = 69) | | 48 hours (N = 68) | | Test | p value |
|-----------------|----|----------------------|------|----------------------|------|--------------|---------|
| | | N | % | N | % | | |
| Wound Condition | 0 | 43 | 62.3 | 46 | 67.6 | Fisher exact | 0.867 |
| | 1A | 13 | 18.8 | 12 | 17.6 | | |
| | 1B | 3 | 4.3 | 2 | 2.9 | | |

Continued

| | | | | | | | |
|-------------------------|----|---|------|---|-------|------------------------------------|-------|
| | 1C | 4 | 5.8 | 2 | 2.9 | | |
| | 2A | 4 | 5.8 | 2 | 2.9 | | |
| Wound Condition | 3A | 1 | 1.4 | 1 | 1.5 | Fisher exact | 0.867 |
| | 4A | 1 | 1.4 | 2 | 2.9 | | |
| | 2D | 0 | 0.0 | 1 | 1.5 | | |
| Mastitis/breast abscess | | 4 | 5.8% | 7 | 10.3% | Chi square test $\chi^2 = 0.94$ | 0.333 |

χ^2 : Chi square test, p value > 0.05: non-significant.

Table 7. Initiation of successful breast feeding and neonatal readmission among study participants.

| | 24 hour (N: 69) | | 48 hour (N: 68) | | Chi square test | |
|---|-----------------|-------|-----------------|-------|-----------------|---------|
| | N | % | N | % | χ^2 | p value |
| Initiation of successful breast feeding | 63 | 91.3% | 60 | 88.2% | 0.35 | 0.553 |
| neonatal readmission. | 4 | 5.8% | 9 | 13.2% | 2.21 | 0.137 |

χ^2 : Chi square test, p value > 0.05 = non-significant.

4. Discussion

This prospective cohort study was conducted during the period from January 2022 to December 2022. 158 patients admitted for elective lower segment cesarean section were included in our study; 81 patients were discharged 48 hours after the procedure which is the standard protocol at Ain Shams University Maternity Hospital while 77 were discharged after 24 hours.

Regarding demographic data, there was no significant difference between the two groups regarding age, parity, and BMI. As for postoperative hemoglobin, there was no significant difference between those who were discharged after 24 and 48 hours; none of the study participants received either intravenous iron or blood transfusion and all were discharged on oral iron therapy for 3 months.

Regarding postoperative care, all patients were instructed to drink clear liquids 6 hours after the cesarean section; semisolids were allowed once the patient passed flatus and the patients were encouraged to mobilize as early as possible. Time till the passage of flatus and stool was assessed before discharge and it was significantly shorter among those who were discharged after 24 hours; such shorter time could be attributed to factors that were not assessed in our study such as the operative time. Further studies are needed to evaluate the possible association between early discharge after cesarean section and the passage of gas and stool. There were no gastrointestinal complications such as ileus or obstruction among the study participants and none of the readmitted cases had any GIT problems. Our results regarding postoperative gastrointestinal complications were similar to those obtained by Bayoumi *et al.*, who assessed the reasons for maternal readmission after cesarean section; among those who were readmitted, there was no significant difference between those who were discharged after 24

hours and those who were discharged after 72 hours regarding intestinal ileus (8.9% and 7.8% of the readmitted cases respectively) [9]. The absence of gastrointestinal complications among the readmitted cases in our study in contrast to the above-mentioned study can be attributed to a smaller sample size and shorter study duration. On the contrary, the presence of ileus as a cause for readmission in the study conducted by Bayoumi *et al.*, could be attributed to the indications of cesarean section among the study participants which included obstructed labor, rupture of membranes for more than 24 hours with no progress in labor, multiple pregnancy in labor and patients with previous cesarean section coming in the first stage of labor [9].

To our knowledge, this was the first study to use the KATZ index of independence in activities of daily living for assessing patients' well-being after cesarean section. The KATZ index consists of 6 items; bathing, dressing, toileting, transferring, feeding, and continence. Each patient was contacted by phone 1, 3, and 5 days after discharge and the total score was measured on each day. There was no significant difference between the two groups regarding each component of the Katz index and the same was observed with the total score. Transferring and toileting were the two most affected components during days 1 and 3 with all patients getting a score of 6 on day 5. Ghaffari *et al.*, found no significant difference regarding satisfaction between patients who were discharged on the first day and those who were discharged on the second day after planned cesarean delivery; the authors used Wong-Baker faces scale to objectively measure pain and satisfaction on discharge day, one week and six weeks after discharge from hospital [5]. Kruse *et al.*, obtained similar results as well in their study; the patients' mobilization after the cesarean section was measured on postoperative days 1 - 4 using a number of daily steps using a Fitbit Flex wristband and there was no significant difference between those who were discharged within 28 hours after cesarean section and those who were discharged after 48 hours [3].

All patients were given the same instructions regarding wound care. They were offered a postpartum visit 1 week after discharge when the wound was objectively assessed by the Southampton wound scale and the patient was evaluated for postpartum complications. There was no significant difference between both arms regarding wound infection. Only one case in the 24-hour arm and 2 cases in the 48-hour arm were graded as 4A on the scale *i.e.* purulent discharge from one point and they were readmitted to the hospital where culture from the discharge was obtained and antibiotics were prescribed according to culture and sensitivity along with saline irrigation twice daily and frequent dressing; no further management was needed and the patients were discharged after 7 days. Similar results were obtained by Ghaffari *et al.*, who showed no significant difference between the study groups regarding surgical site infection and separation of incision when the patients were assessed 1 and 6 weeks after discharge [5].

Regarding readmission, there was no significant difference between the two arms of the study as five cases were readmitted from the 24-hour group (7.2%); one due to wound infection and the other four due to puerperal pyrexia caused

by mastitis which was managed conservatively with hot fomentation before feeding, ensure complete drainage of the breast during the fed analgesics, anti-pyretics and 10-day course of antibiotics, both patients were discharged after 72 hours. As for the 48-hour arm, 7 cases were readmitted (10.2%); two cases were due to wound infection, three cases were due to mastitis managed in the same manner as the 24-hour patients, and two cases were readmitted due to pyelonephritis who were managed with intravenous fluids, broad-spectrum IV antibiotics, urine culture and then antibiotics were given according to culture and sensitivity. Both patients were discharged after 5 days when they become afebrile for 48 hours. Our results were similar to results obtained by Bostanci Ergen *et al.*, in their retrospective study which included 14,460 cases and evaluated readmission rates between groups with early discharge versus late discharge after vaginal or cesarean deliveries. The most common reason for readmission was wound infection in both groups [10]. Oben *et al.*, showed in their study which assessed the influence of timing of maternal discharge after CS on the risk of maternal readmission within 6 weeks of delivery that the composite of maternal postpartum readmission, unscheduled clinic or emergency room visit was higher in patients who were discharged on postoperative day 3 or ≥ 4 compared to those who were discharged on postoperative day 2. This can be attributed to the fact that patients included in that study had unscheduled CS which carried higher risks than elective CS. Moreover, they were randomized based on the addition of azithromycin and the timing of that addition to the antibiotic regimen to prevent infection and so, the timing of maternal discharge was a secondary analysis of the study [11]. There were no postpartum DVT, endometritis, or respiratory complications among study participants.

Regarding breastfeeding, there was no significant difference between the two arms of the study regarding initiation of successful breastfeeding which was evaluated at the postpartum visit 1 week after discharge. Our results were consistent with results achieved by Tan *et al.*, who showed that the time of maternal discharge after planned cesarean delivery either on day 1 or day 2 has no effect on neonate's breastfeeding. Feeding status was assessed 2 and 6 weeks after discharge [12]. Onu *et al.*, had similar results in their study which evaluated maternal and neonatal outcomes after uncomplicated cesarean delivery; there was no significant difference between patients who were discharged on day 2 and patients who were discharged on day 5 or 7 regarding initiation and maintenance of breastfeeding practices. The assessment of the study group after discharge was made through twice daily phone calls starting two days after discharge and continuing till the 5th or 7th day after discharge [13].

Neonatal readmission after discharge was assessed at the postpartum visit 1 week after discharge. Among the 24-hour arm, 4 neonates have been readmitted; 3 cases due to neonatal jaundice which required phototherapy, and 1 case for feeding support. As for the 48-hour arm, 9 neonates were readmitted; neonatal jaundice was the predominant reason (4/9) with 3 cases requiring phototherapy, and an exchange transfusion was needed in one patient. Two cases were read-

mitted for feeding support, two cases were readmitted for respiratory support and the last case was readmitted for a sepsis workup. Our results were not consistent with the study conducted by Bayoumi *et al.*, who showed significantly higher neonatal readmission rates among those who were discharged after 24 hours compared with those who were discharged after 72 hours. Neonatal jaundice was the reason for such higher readmission rates in the previously mentioned study [9]. Such differences between the results could be attributed to higher sample size, longer study duration in the previously mentioned study, and the possibility of improper lactation instructions among the early discharge arm. This assumption is supported by another finding in the same study showing the higher success of breastfeeding among those who were discharged after 72 hours [9].

Our study was not without limitations; the study participants were offered one postpartum visit 1 week after discharge; another visit 6 weeks after discharge was not possible due to a lack of contraceptive methods at our hospital. Such methods are available mainly at the ministry of health primary care centers and private clinics. Future studies with longer intervals between delivery and postpartum visits are needed for greater assessment of wound condition and neonatal readmission among patients with early discharge after CS.

5. Conclusion

Early discharge 24 hours after cesarean section is as safe and effective as traditional discharge after 48 hours. The policy of early discharge can be adopted in low-risk cases scheduled for elective uncomplicated CS. Proper instructions regarding red-flag maternal and neonatal symptoms must be provided and a proper follow-up plan must be ensured.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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