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RISK FACTORS FOR EMERGENCY CESAREAN DELIVERY AFTER INDUCTION OF LABOR USING MISOPROSTOL: A CROSS-SECTIONAL STUDY

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ABSTRACT

Objective: The aim was to assess the risk factors for emergency cesarean delivery after induction of labor by misoprostol. **Methods:** It is a cross-sectional study in which all women with a single, full-term pregnancy who got misoprostol induction of labor were delivered at Shifa Medical Complex's obstetric department. The proportions were compared using the 2 test to see if there were any changes by mode of delivery. With a 95 percent confidence level, bivariate logistic regression was used to determine the probabilities of an emergency cesarean section. **Main outcome measures:** The primary outcome was the likelihood of an emergency cesarean delivery in induced women using misoprostol in singleton, full-term pregnancies at Shifa Medical Complex's obstetric department. **Result:** In our study, the probability of cesarean section was 14 percent among 524 women who were induced for labor using misoprostol for a variety of reasons. Primiparous women, older women, poor bishop scores, low birth weights, post-term pregnancy, GDM, and maternal anemia are all linked to an increased risk of cesarean section. Cesarean section rates varied among induced laboring women, ranging from 15.8 percent to 55.5 percent to 13.3 percent to 15.3 percent to 25 percent to 11.1% among primiparous, older women, low birth weights, post-term pregnancy, GDM, and maternal anemia women, respectively. In the study population, the odds of an emergency cesarean birth increased, with crude odds ratios ranging from 0.41 (95 percent CI 0.98 to 1.80) to 7.4 (95 percent CI 0.98 to 1.80). (95 percent CI 1.92 to 28.45) There were numerous risk factors in the research population that enhanced the rate of cesarean delivery. Significant disparities were found between two groups of induction in the research population. **Conclusion:** Induction of labor in primiparous, older women, low bishop score, low birth weights, post-term pregnancy, GDM, and maternal anemia were all strongly linked to an increased risk of cesarean delivery in the study population. Assessment of these factors will be predictable to reduce the complication of pregnancy outcomes among induced women related to emergency cesarean section.

KEYWORDS: Induction of labor(IOL), misoprostol, bishop score ,cesarean section(CS).

INTRODUCTION

Induction of labor (IOL) is one of the most frequently used obstetric interventions. It is an artificial stimulation of uterine contraction aiming for vaginal delivery.[1] The prevalence of IOL varies in different countries starting from 9% and exceeding 20% in some other countries.[2 3] IOL is associated with increased risks for maternal complications such as operative deliveries, tachysystole, uterine rupture as well as fetal complication such as Neonatal ICU admission. However, there is high-level evidence demonstrating the benefits of IOL when indicated specially when performed after 41 weeks.[1,4] IOL can be done for maternal indication such as hypertension, preeclampsia, premature rupture of membranes as well as fetal indication such as intrauterine growth retardation and fetal demise.[5.6]

One of the most important predictor scores for IOL performance is the Bishop score. The Bishop score was found to be associated with an increased risk of cesarean birth in the majority of studies that included it. Most studies which included the Bishop score found that low Bishop score is associated with an increased risk of cesarean delivery.[7,8]

IOL is achieved via pharmacological approaches such as oxytocin (syntocinon), dinoprostone (prostin E2), and Misoprostol (Cytotec). Since 2006, Palestine has had a national IOL protocol, which was modified in 2016. 9 When the Bishop score is less than 6, the recommended pharmacological therapies for IOL in Palestine are dinoprostone (prostin E2) and Misoprostol (Cytotec).[9]

The primary goal of this study was to determine the likelihood of a cesarean delivery in women using Misoprostol in the obstetric department at Al Shifa Medical Complex who had a singleton, cephalic IOL.

METHODS

Using maternally linked data from the obstetric department at al-shifa medical complex birth registry, a hospital-based retrospective cross sectional study was developed among mothers who gave birth to singleton kids from October 2018 to September 2019.

The study comprised all women with singleton, full term (≥37 weeks gestation) pregnancy who received induction of labor by misoprostol and delivered in the obstetric department at Shifa Medical Complex from 1st October 2018 to 30th September 2019 were included in the study. The study hospital is the largest hospital in Gaza, with approximately 15 000 deliveries per year. It is a teaching hospital provides medical education to current health professionals with a post graduate teaching program. Furthermore, it is Gaza's primary referral hospital, receiving high-risk patients from both public and private facilities.

All women having a Bishop score of 7 or more, as well as those who used Prostaglandin E2 to induce delivery, were eliminated from the study (Figure 1). The study included the remaining 564 women who used misoprostol to induce labor and had a Bishop score of 7 or higher. According to local Palestinian procedure, the induction of labor protocol in Palestine is to take 50 micrograms of misoprostol orally every 6 hours until the active phase of labor has begun, with a maximum of 8 doses.

Pregnant women were classified into two groups based on mode of delivery.

Risk factors

Maternal age, gestational age, reason for induction of labor, Bishop score, method of induction, use of opioid for pain relief, mode of delivery, fetal weight, fetal gender, and maternal disorders like anemia, hypertension, and diabetes mellitus were all gathered retrospectively from medical records.

The age of the mother was divided into four categories: 20, 21-30, 31-40, and >40 years (table 1). The number of prior viable births (>26 weeks gestation) was classified as parity, which was divided into two categories: zero (nulliparous) and one (nulliparous) (Parous). Full-term (37+0 – 41+7) and post-term (42+0) gestational age were separated. Normal vaginal delivery and emergency caesarean section were the two options for delivery. Medical conditions are divided into two categories: yes and no.

Outcomes

The adjusted ORs of emergency caesarean section among singleton cephalic pregnant women who used misoprostol to induce labor were the primary outcome. Emergency caesarean sections were performed in the study hospital in a variety of clinical scenarios, ranging from urgent danger to the mother or infant to problems that necessitated an early delivery.

Statistical analysis

The features of the study population were subjected to descriptive analyses. The proportions were compared using the 2 test to see if there were any changes by mode of delivery. Logistic regression models, stratified by mode of birth, were used to determine the probabilities of an emergency caesarean section. Potential confounders were mother age, gestational age, opiate use for pain treatment, maternal disorders such as anemia, hypertension, and diabetes mellitus, fetal weight, and fetal gender.

Using a bivariate logistic regression model, the strength of the link between each variable and the odds of emergency caesarean section was assessed using odds ratios (ORs) with 95 percent confidence intervals (95 percent CI). Statistical significance was defined as a P-value of less than 0.05. SPSS V.23 was used for all statistical analyses (SPSS, Chicago, Illinois, USA). The local Ethics Committee of Gaza, Palestine (no 836137) granted the study ethical approval.

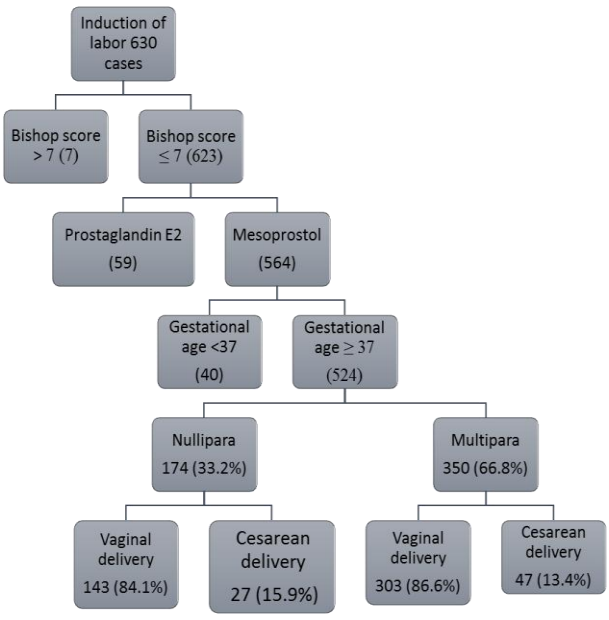

Figure 1: Shows the inclusion and exclusion criteria used in the study population.

RESULT

The aim was to analyze the association between induction of labor by misoprostol and risk for emergency cesarean delivery at gestational week ≥37 in women with an unripe cervix, and to evaluate to what extent the association was influenced by parity.

Table 1: The characteristics of study population (N= 524).

	Vaginal delivery N (%)	Cesarean section N (%)	P value
Maternal age			
≤ 20	42 (9.4%)	5 (6.8%)	.003
21-30	326 (73.1%)	55(74.3%)	
31-40	74 (16.6%)	9 (12.2%)	
> 40	4 (0.9%)	5 (6.8%)	
Parity			
Primipara	143 (32.1%)	27 (36.5%)	0.452
Multipara	303 (67.9%)	47 (63.5%)	
GESTATIONAL AGE			
37_40 Weeks	229 (51.3%)	35 (47.3%)	0.519
> 40 Weeks	217 (48.7%)	39 (52.7%)	
Use opioid for pain relief			
No/	337 (79.1%)	54 (73.0%)	0.238
Yes	89 (20.9%)	20 (27.0%)	
Anemia			
No	200 (44.8%)	43 (58.1%)	0.034
Yes	246 (55.2%)	31 (41.9%)	
HTN disorders			
NO	310 (69.5%)	53 (71.6%)	0.772
GESTATIONAL HTN	128 (28.7%)	19 (25.7%)	
PREECLAMPSIA	8 (1.8%)	2(2.7%)	
DM disorders			
NO	428 (96.0%)	68 (91.9%)	0.122
GESTATIONAL DM	18 (4.0%)	6 (9.1%)	
Fetal weight			
<2500 gm	351 (78.7%)	54 (73.0%)	0.048
2500-4000 gm	64 (14.3%)	18 (24.3%)	
>4000 gm	31 (7.0%)	2 (2.7%)	
Fetal gender			
Male	221 (49.6%)	38 (51.4%)	0.774
Female	225 (50.4%)	36 (48.6%)	

524 women with a singleton, full term (37 weeks gestation) pregnancy who received IOL by misoprostol and delivered in the obstetric department at Shifa Medical Complex were included in the study population.

Table 1 shows the characteristics of the study population at the time of admission, broken down by mode of delivery. The bulk of the participants in the study (72%) were between the ages of 20 and 30. There were significant differences in maternal age among the induction groups, with the highest percentage of normal and CS being older (20 years) and younger (30 years) respectively (P=.003). About 85% of primiparous and multiparous women had a normal delivery. In terms of parity, there were no significant differences between the two groups (P=.452). The study population's gestational age ranged from 37 to 43 weeks (mean 39 weeks) with an initial bishop score ranging from 0 to 9. There were no significant differences in the study population's gestational age (P=.519) or use of opioids for pain treatment (P=.238).

About 55 percent of women were anemic (Hb level 10.5 mg/dl), and there were substantial variations in anemic women between two groups, thus more than 11 percent of anemic women were delivered CS. for medical reasons. Preeclampsia was induced in 1% of the trial participants.

GDM (gestational diabetes mellitus) was found in 5% of the women. In the study population, there were no significant differences in hypertensive women (P=.772) or diabetic women (P=.122). The majority of mothers in the study group (83.6%) gave birth to babies weighing less than 4000 grams, with a mean neonatal birth weight of 2000 grams. Children with a birth weight of less than 2500 grams had the highest prevalence of CS. The difference in birth weight between the two induction groups was significant (P =.034). Approximately 85 percent of women were delivered regularly, while 15% of those in our study were delivered CS. In terms of newborn sex, there were no significant variations between the two groups.

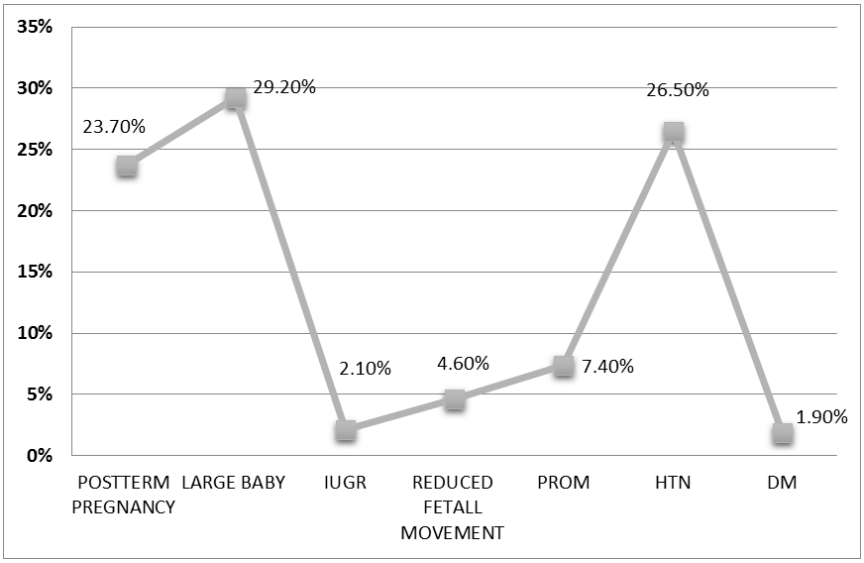

Figure 2: Shows the signals of induction of labor.

CS was used in 74 (14.1 percent) of the 524 induced births studied. The signal for induction of labor was appreciated in figure 2. There are numerous signs of induction. Large babies (29.20 percent), hypertensive mothers (26.50 percent), and post-term pregnancy (23.70 percent) had the highest peaks, whereas diabetic and IUGR cases had the lowest frequency (1.90 percent) and (2.10 percent), respectively. There were two other IOLs with distinct values: a percentage of PROM (7.40%) and a percentage of diminished fetal movement (4.60%).

Table 2: OR and 95% CIs for caesarean section among women received induction of labor.

	Crude OR (95%CI)	P value
Maternal age		
≤ 20	0.71(0.27-1.86)	.016
21-30	Ref.	
31-40	0.72 (0.34- 1.52)	
> 40	7.41(1.92-28.45)	
Parity		
PG	Ref.	.453
MG	0.82(0.49-1.37)	
GESTATIONAL AGE		
Full term	Ref.	.519
Post term	0.85(0.52-1.40)	
Use opioid for pain relief		
No	Ref.	.240
Yes	1.40(0.80-2.46)	
Anemia		
No	Ref.	.036
Yes	0.60(0.36-1.10)	
HTN disorders		
No	Ref.	.773
Gestational HTN	0.90(0.50-1.52)	
Preeclampsia	1.50(0.30-7.10)	
DM disorders		
No	Ref.	.130
Gestational DM	2.10(0.80-5.50)	
Fetal weight		
<2500 gm	1.82(1.01-3.32)	.055
2500-4000 gm	Ref.	
>4000 gm	0.41(0.98-1.80)	
Fetal gender		
Male	Ref.	.774
Female	0.93(0.60-1.52)	

Table 2 shows the odds ratios (ORs) and 95 percent confidence intervals (CIs) for CS among women who had labor induction. The study discovered a statistically significant link between maternal age and the probability of CS in the adjusted analysis. Cesarean section was 7.4 times more likely to occur in mothers over the age of 40 than in mothers under the age of 40. When compared to primiparous women, multiparous women had an 18% lower chance of achieving CS delivery. Women who were full-term (37+0 – 41+7) at the time of induction had a lower risk of CS intervention than those whose pregnancy was at post-term during labor induction, according to our findings. Induced women who used opioids for pain treatment had a 14-fold higher risk of CS than women who did not use opioids. In both groups of induction, there is a substantial difference in anemic women; the risk of CS in non-anemic women is 40% lower than in anemic women. Those with hypertension had a 10% lower risk of CS than women without hypertension. Preeclampsia, on the other hand, raised the risk of CS by 1.5 times in preeclamptic women. We also discovered that diabetic women have a twofold increased incidence of CS in the study sample.

The researchers also discovered a statistically significant link between birth weight and the likelihood of CS. We discovered that the lower the fetus's weight, the more likely a mother is to give birth via CS after IOL. Low birth weight (less than 2500 grams) increased the risk of CS by 1.8 times compared to high birth weight (more than 4000 grams). We found no significant link between neonatal sex and CS delivery; however, the rate of CS delivery was higher in women who gave birth to male neonates than in those who gave birth to female neonates (51.4 percent VS 48.6 percent P=.774), with OR 0.93 and 95 percent CL (0.60-1.52).

DISCUSSION

The rate and likelihood of an emergency cesarean section among single, full-term pregnancies who got IOL utilizing misoprostol for groups of induction showed the biggest disparities between study populations.

In our study, induction of labor was effective, and the rate of cesarean birth was 14%.

According to WHO recommendations, the incidence of cesarean section should not exceed 15% of overall deliveries.[10]

Our findings show that the rate of cesarean section after IOL is increasing in women of advanced maternal age. Maternal age was found to be a major independent risk factor for cesarean birth. According to many other researchers, the higher the maternal age, the greater the probability of cesarean birth.[11,12] Our findings imply that more than a quarter of all induced women had a caesarian section, and that primiparous women were more likely to have one. These findings are consistent with those of research conducted in Ethiopia and Pakistan.[11.13.14]

According to some authors, primiparous women have no labor experience because they have never had a child. When compared to parous women, who are defined as labor experienced women, it is difficult to achieve due to dissoluted cervical collagen fibers.[15]

Inducing labor before week 41 significantly raises the likelihood of an emergency cesarean section. These findings are consistent with what has been discovered in other nations.[17,18,19] This emphasizes the significance of meticulous planning and patient selection when considering an intervention.[16] Women who were full-term (37+0 – 41+7) at the time of induction had a lower risk of CS intervention than those whose pregnancy was at post-term during labor induction, according to our findings. Some publications addressed the reasons for the elevated rate of caesarian sections in post-IOL pregnancies.[17,18]

In addition to the Bishop score, information about risk factors for postterm pregnancy and failure of labor induction may be included in the evaluation of the woman prior to labor induction. The most common reason for induction in our study was a large baby, which differs from previous studies[22,23,24], whereas the third most common reason for induction in this study was a post-term pregnancy, which is similar to other studies.[22,23,24] [21].

There are substantial disparities in the use of opioids following induction of labor between two groups of induction. Our study found a twofold increase in the risk of cesarean section after taking opioids, which is consistent with other studies.[20] Our research found a clear link between successful induction of labor and bishop score, with a bishop score of less than 5 being an obvious risk factor for induction success and the risk of cs. These findings are consistent with those of other studies.[25]

Anemia is the most frequent illness that affects pregnancy; in our study, the risk of caesarian section increased by 60% in anemic women. Anemia is a substantial risk factor for cs on its own. There was a link between low birth weight, anemia, and a high cs rate. There are studies that support our findings.[26] Women who have a baby weighing less than 2500 grams have a two-fold increased risk of cs compared to women who have a baby weighing more than 4000 grams.

We discovered practically all cases of medical problems, including gestational diabetes, gestational hypertension, chronic hypertension, and preeclampsia, at 38 weeks of pregnancy, indicating a reduction in maternal and neonatal complications.

Almost all of the participants in our study were induced for labor owing to gestational diabetes mellitus during 38 39 weeks of pregnancy, which is beneficial since it reduces the risk of complications such as shoulder dystocia. These findings are consistent with those of other investigations.[27,28]

We found that gestational diabetes mellitus increases the rate of cesarean delivery by double (OR 2.10, 95 percent CL 0.80-5.50) in other studies that contradicted our findings.[27,28]

At 38 -39 weeks of pregnancy, gestational hypertension and preeclampsia were induced, which has a number of advantages in terms of reducing morbidity and mortality in both the mother and the newborn.[29] Many research include similar data in their guide lines.[29] Women with preeclampsia had a 7-fold increase in the risk of cesarean delivery (OR 1.50, 95 percent CL 0.30-7.10), while women with hypertension have a 10% reduction in the probability of cesarean delivery. The ability to predict which women would require CS after labor induction is a significant difficulty in modern obstetrics. Following a labor induction, CS is linked to a higher risk of problems for both the newborn and the mother.[32]

Prior to labor induction, a cervical evaluation is done to determine the chance of a vaginal delivery. We could look into the impact of the labor induction method or the cervical Bishop Score. However, both digital and TVU cervical assessments have a limited prognostic value for vaginal birth after a term induction.[30,31]

CONCLUSION

We discovered substantial evidence of a relationship between elective induction of labor by any of the commonly used methods and birth by CS using a population dataset with verified accuracy, which remained significant after adjustment for major variables. An increase in the likelihood of CS was also linked to augmentation of spontaneous labor. The rise in CS is attributed to underlying risk factors identified in the hospital trial, as the women in this study had clear indications for induction of labor. among the participants in the research , In primiparous, older women, poor bishop score, low birth weights, post term pregnancy, GDM, and maternal anemia were all linked to an increased risk of emergency cesarean delivery after induction of labor (IOL) with misoprostol. The evaluation of these risk variables resulted in recommendations to prevent maternal and fetal problems, as well as pregnancy-related induction of labor and emergency cesarean delivery.

Abbreviation

IOL: Induction of Labor
CS: Cesarean Section
GDM: Gestational Diabetes Mellitus.
PROM: Premature Rupture of Membrane.
HTN: Hypertension.
IUGR: Intrauterine Growth Restriction
ABP: Arterial Blood Pressure.
ICU: Intensive Care Unit.
P: Probability
OR: Odds Ratio.
CL: Confidence Interval.
TVU: Transvaginal Ultrasound
WHO: World Health Organization

The strengths and limitation

Our study's strengths include being retrospective, investigating nulliparous and multiparous women who induced for various reasons, providing information on the confirmation of the Bishop score in predicting successful induction, providing information on the outcome of induction as one of the most common obstetric interventions as well as the risk of cesarean section among the study population who underwent induction of labor, and comparing groups based on mode of delivery.

The absence of data on the Latent and Active phases during the first and second stages of labor, as well as the fact that they were not compared to women in spontaneous labor, could be a drawback of our study. We focused on misoprostol (cytotec) induction of labor and did not compare it to other chemical or mechanical methods.

In our hospital, the maternal weight and body mass index were incorrectly recorded. Also, the risks of this treatment have not been researched, and the cervical check has only been done by finger examination. Because this study was only conducted at one location, it has a poor power and cannot be effectively generalized. As a result, more research is needed to identify the induction period and intervention decision time in nulliparous and multiparous women.

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