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# Bishop Score in Induction of Labor in Unfavorable Cervix and Success of Labor

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## Abstract

**Background and objectives:** The ripeness of the cervix has a potential impact on the successful of labor induction; however, an unfavorable or unripe cervix hinders the labor induction process. Thus, we aimed to determine the relationship between Bishop score and the success of labor induction in the unfavorable cervix.

**Methods:** This cross-sectional prospective study was conducted on 100 pregnant women with an unfavorable cervix and a Bishop score <5 at Sulaimani Maternity Teaching Hospital, Sulaimaniyah, Iraq, from May 2022 to May 2023. The women's primary and clinical data were reported. Various medications at various doses and routes were used for labor induction. Then, correlations between variables and different maternal factors were found.

**Results:** Most women (55%) were aged 20-30 years, multipara (59%), urban (61%), literate (92%) and had gestational age of 40-41 weeks (89%) with O+ blood group (41%). Additionally, most women (40%) received a combination of misoprostol and pitocin for labor induction and had a normal vaginal delivery (73%), with a 100% alive baby born. Moreover, the score of labor induction were significantly higher ($p \leq 0.05$) in normal vaginal delivery than in caesarian delivery. Finally, the parity was significantly ($p=0.002$), and the bishop score was highly significantly ($p<0.001$) associated with the success of labor.

**Conclusions:** A combination therapy resulted in the most successful labor induction and most vaginal delivery. Parity was related to successful labor induction, while maternal age did not. Increased bishop score is directly related to normal vaginal delivery.

**Keywords:** Abnormal cervix, Bishop score, Labor induction, Prospective study

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## Introduction

The Bishop Score (BS) is intended to assess the probability of positive vaginal birth in multiparous women experiencing labor induction; thus, it can be used as a predictor of labor induction success.[1] Generally, successful vaginal delivery is anticipated to occur spontaneously, especially in young normal healthy women; however, sometimes labor need to be induced due to unfavorable and equivocal cervix to save the mother and baby's life.[2] Unfavorable cervix is a condition in which the process of softening, shortening, and partial dilation of the cervix is minimal or unusually takes place in the days or weeks before the onset of labor. These minimal changes make the cervix more resistant to attempts at normal labor induction. Thus, mechanical or pharmaceutical methods require cervical ripening.[3] Misoprostol, an active prostaglandin E1 analogue, has been used widely by the vaginal and oral routes for labor induction in or near term. Recent studies have confirmed that it is highly effective in reducing the rates of cesarean section (C/S) in spite of rise in fetal heart rate (FHR). However, postnatal bleeding may be more after labor induction with misoprostol, and uterine rupture, with/without earlier C/S, have occurred, but doses might lessen adverse effects.[4, 5] Whereas Pitocin, a synthetic version of oxytocin, can be used alone or in combination with other medications for labor induction but it hurts breastfeeding success in the early postpartum period. [6,7] Objective scoring approaches have been produced in an exertion to expect vaginal birth. The BS was first created by Dr Edward Bishop in 1964 that sets cervical dilation, station, effacement, position, consistency, and position of the fetal head by manual vaginal inspection. Since its conception, a BS of ≤6 has been unfavorable for labor induction, while a score of >8 is favorable.[1] However, BS is not an accurate process of foreseeing birth results as its sensitivity is 24 - 64%.[8] Thus, according to some research, cervical sonographic evaluation is more sensitive than BS in predicting successful labor.[9, 10] Overall, BS continued to be the typical way of cervical valuation as it is not expensive, readily available, and a simple that does not need any particular setting or equipment.[11] The rates of labor induction have increased over the last two decades.[1] Successful labor induction is usually predicted with cervical ripening among women with a Bishop score <3.[12] Therefore, we designed to evaluate the correlation of Bishop's score on the success of labor induction in the unripe cervix.

## Patients and methods

Using a simple random sampling method, this cross-sectional prospective study was done on 100 pregnant women with an unfavorable cervix at Sulaimani Maternity Teaching Hospital, Sulaimaniyah, Iraq, from May 2022 to May 2023. Women with a singleton pregnancy, viable fetus, cephalic/vertex fetal, post-term pregnancy (>40 weeks), uncomplicated pregnancy, and unfavorable cervix (BS of <6) were enrolled in this study, while those with multiple pregnancies, complicated pregnancies, abnormal fetal presentation, premature fetuses, previous C/S, and those with an intrauterine death were excluded. A validated questionnaire collected patients' primary data, including maternal age, residency, educational level, gravida, gestational age, and ABO blood group. The unfavorable cervix among studied pregnant women was confirmed with BS per vaginal examination, while U/S confirmed the gestational age by the same researcher. Then, a questionnaire was filled out for all of them, and induction of labor was started using various medications, including misoprostol alone (4 doses of 50 µg each 6 hhoursfor primiparous and 4 doses of 25 µg each 6 hour for multiparous), Pitocin alone (2-4 IU), or a combination of both. The study was approved


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by the Kurdistan Higher Council of Medical Specialties (KHCMS), Sulaimaniyah, Iraq. Written informed consent was obtained from patients. The Statistical Package for the Social Sciences (SPSS, IBM, Chicago, USA, version 27) were used for data analysis. Independent samples t-test and Mann–Whitney U test was used for parametric and non-parametric variables, respectively, while Chi-square test was used for categorical variables. P≤0.05 was considered a significant difference.

## Results

The mean age of patients was 28.43 ± 6.09 years, mostly between 20-30 years (55%), followed by >30 years (38%) and then <20 years (7%). Primiparous accounted for 41%, while multipara was 59% among studied women. Regarding residency, 61% were urban, and 39% were rural residents. Most women were literate (92%), and the rest (8%) was illiterate. Regarding the gestational age, 89% were between 40-41 weeks, and 11% were >41 weeks. Regarding the ABO blood group of the pregnant women, most were O+ (41%), followed by A+ (27%), B+ (14%), AB+ and A- (7%), then B- and O- (2%), as shown in Table (1).

**Table (1):** Essential characteristics of the patients.

| Variable | | Frequency | percentage |
|---|---|---|---|
| Maternal age (Years) | < 20 | 7.0 | 7.0 |
| | 20 - 30 | 55 | 55 |
| | > 30 | 38 | 38 |
| Gravity | Primipara | 41 | 41 |
| | Multipara | 59 | 59 |
| Residency | Urban | 61 | 61 |
| | Rural | 39 | 39 |
| Maternal education | Literate | 92 | 92 |
| | Illiterate | 8.0 | 8.0 |
| Gestational age (Weeks) | 40 - 41 | 89 | 89 |
| | > 41 | 11 | 11 |
| ABO Blood Group | A+ | 27 | 27 |
| | A- | 7.0 | 7.0 |
| | B+ | 14 | 14 |
| | B- | 2.0 | 2.0 |
| | AB+ | 7.0 | 7.0 |
| | O+ | 41 | 41 |
| | O- | 2.0 | 2.0 |
| Total | | 100 | 100 |

About 31% of patients received intravaginal misoprostol tablet alone for induction, and 40% were started by intravaginal misoprostol tablet and then intravenous injection of Pitocin. In comparison, 29% received intravenous injections of Pitocin alone, as shown in Table (2).

**Table (2):** Dose and frequency of both misoprostol and Pitocin used for induction of labor in studied pregnant women.

| Medication | Frequency | Percentage |
|---|---|---|
| Misoprostol alone | 31 | 31 |
| Misoprostol with Pitocin | 40 | 40 |
| Pitocin alone | 29 | 29 |
| Total | 100 | 100 |

Most patients had a normal vaginal delivery (73%), whereas 27% required a C/S. The main reason for C/S was failure of progress (44%), followed by fetal distress (33.3%), loss of descent in the second stage (7.4%), collapse of induction (7.4%), and meconium stadium (7.4%). Indeed, all born babies have been alive; 49% were females, and 51% were males, as shown in Table (3).

**Table (3):** Mode of delivery and fetal outcomes.

| Variable | | Frequency | Percentage |
|---|---|---|---|
| Mode of delivery | Vaginal | 73 | 73 |
| | Cesarean | 27 | 27 |
| Cause of cesarean | Failure of descent (FOD) | 2 | 7.4 |
| | Failure of induction (FOI) | 2 | 7.4 |
| | Failure of progress (FOP) | 12 | 44.4 |
| | Fetal distress | 9 | 33.3 |
| | Meconium stadium | 2 | 7.4 |
| Fetal outcome | Alive female | 49 | 49 |
| | Alive male | 51 | 51 |



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Parity closely associated with a successful labor induction since multiparous women had a significantly (p=0.002) more chances of success than primiparous (68.5 vs 31.5%). However, the maternal age was not significantly (p=0.134) associated with the success of labor induction, as shown in Table (4).

**Table (4):** Association between maternal characteristics and mode of delivery.

| Variable | | Mode of delivery | | p-value |
|---|---|---|---|---|
| | | Vaginal | Cesarean | |
| Parity Number (%) | Primipara | 23 (31.5) | 18 (66.7) | 0.002* |
| | Multipara | 50 (68.5) | 9.0 (33.3) | |
| Maternal age (Mean ± SD) | | 28.99 ± 6.22 | 26.93 ± 5.57 | 0.134 |
| Total | | 73 | 27 | |

*Significant difference using the Chi-square test

After introducing dilatation, effacement, station, consistency, and position, the mean score of each factor was significantly higher (p≤0.05) in normal vaginal delivery than in C/S. The mean values were 0.99 ± 0.57, 0.53 ± 0.58, 0.14 ± 0.35, 0.11 ± 0.32 and 0.58 ± 0.55 for each dilatation, effacement, station, consistency, and position, respectively, in vaginal delivery, while the mean values in C/S mode were 0.67 ± 0.62, 0.19 ± 0.39, 0.01 ± 0.002, 0.81 ± 0.68 and 0.33 ± 0.48 for each dilatation, effacement, station, consistency, and position, correspondingly), as shown in Table (5).

**Table (5):** Labor induction factors affecting the mode of delivery among studied patients.

| Variable | Mode of delivery | | p-value |
|---|---|---|---|
| | Vaginal (*n*=73) | Cesarean (*n*=27) | |
| | Mean ± SD | | |
| Dilatation | 0.99 ± 0.57 | 0.67 ± 0.62 | 0.015* |
| Effacement | 0.53 ± 0.58 | 0.19 ± 0.39 | 0.005* |
| Station | 0.14 ±0.35 | 0.01 ± 0.002 | 0.044* |
| Consistency | 1.32 ± 0.66 | 0.81 ± 0.68 | 0.002* |
| Position | 0.58 ± 0.55 | 0.33 ± 0.48 | 0.05* |

*Significant difference using the Chi-square test

Also, BS was highly significantly (p<0.001) associated with the success of labor. By increasing the BS, the maternal was more easily undergoing expected vaginal delivery since the total score was 3.53 ± 1.23 for vaginal delivery and 2.0 ± 1.0 in C/S, as shown in Table (6).

**Table (6):** Comparison of the mean Bishop score to the mode of delivery.

| | Mode of delivery | | p-value |
|---|---|---|---|
| | Vaginal (*n*=73) | Cesarean (*n*=27) | |
| Bishop's score (Mean ± SD) | 3.53 ± 1.23 | 2.00 ± 1.00 | <0.001* |

*Highly significant difference using the Chi-square test

Interestingly, 57.9% of those pregnant women whose BS was 1,2 and 3 underwent normal vaginal delivery, and 42.1% were cesarean. On the other hand, 93% of patients whose score was 4 and 5 had a normal vaginal delivery, and only 7.0% had caesarian mode, as shown in Table (7).

**Table (7):** Association between Bishop score to the mode of delivery.

| Bishop's score | Mode of delivery | | p-value |
|---|---|---|---|
| | Vaginal (*n*=73) | Cesarean (*n*=27) | |
| 1, 2 and 3 | 33 (57.9) | 24 (42.1) | <0.001* |
| 4 and 5 | 40 (93) | 3.0 (7.0) | |
| Total | 73 | 27 | |

*Highly significant difference using the Chi-square test

## Discussion

Recent evidence supports elective induction of labor rather than over-expectant management after 39 weeks' gestation.[1] However , labor induction in women with an unfavorable cervix with a BS <6 may take several days. Examining cervical status before installation is essential to find the possibilities of successful vaginal delivery.



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Thus, we used BS manual examination in this study to find its correlation with delivery mode among pregnant women after medicinally induced laboring the current study, most studied pregnant women (55%) were aged 20-30 years with a mean age of 28.43 ± 6.09 years, multipara (59%), urban (61%), literate (92%) and had a gestational age of 40-41 weeks (89%). In this regard, Ikeotuonye et al. found the same mean age of the women (28.4 ± 5.8 years); however, most of their studied women were nulliparous (45.45%) with gestational age of >42 weeks (43.94%) which are not agreed with our study's results.[2] Additionally, Mehta et al. mentioned the mean age of most (87.5%) pregnant women was <25 years, and the most frequent cause of induction of labor was post-dated pregnancy (47.5%).[13] Additionally, Abdulla et al. found that the mean age of pregnant women was 30.35 years, most multiparous (55.1%), with a mean gestational age of 39.1 weeks.[11] In this study, we used BS to predict normal vaginal delivery and successful labor induction, while other studies used various techniques. In this regard, Abdullah et al. confirmed that sonography of cervix expects the success of induction of labor with same diagnostic accuracy to that of conventional BS.[11] Also, U/S measurements were suggested to be better than the BS in predicting successful vaginal delivery.[14] Furthermore, in this study, most women (40%) received a combination of misoprostol and Pitocin for labor induction, while others received either misoprostol (31%) or Pitocin (29%) alone. In this regard, another study used 50 µg of misoprostol alone for labor induction, resulting in cervical ripening in most patients (56.82%).[2] According to the Listening to Mothers II survey, 50% of women giving birth in USA hospitals received Pitocin for either induction or augmenting labor.[7] At the same time, another study in Israel used oxytocin, inopportune or a transcervical double balloon catheter to enhance labor induction in multiparous women with a singleton pregnancy.[8] In Sweden, oral Cytotec® and balloon catheters are more successful for labor induction and vaginal delivery (almost 70%) despite an unfavorable cervix than Minprostin®.[15] Also, it was indicated that misoprostol is an effective adjunct to trans-cervical balloons and reduces time to delivery than balloons alone. Once misoprostol is forbidden, oxytocin is efficient adjunct to trans-cervical balloons.[3]

In the present study, most women with induced labor had expected vaginal delivery (73%). This result is similar to that of another study that found 75.4%[2] and 71.5%,[13] but higher than another study that found 68%[12] and 70.5%.[16] These differences might be related to the difference in practice/environment, using different techniques/medications for labor induction, maternal age, and parity. Simultaneously, the rate of C/S in this study was 27%, which is similar to another study that found 27%,[13] higher than that found in France (22%)[12] and Ethiopia (24%),[16] but lower than that found in Malaysia (29.6%).[11] Gestational age (≥40 weeks), parity, maternal age, nulliparity, BMI at delivery, and BS score.[17] The leading causes of C/S in this study were failure to progress (44%), followed by fetal distress (33.3%), failure of descent in the second stage, failure of induction, and meconium stadium (7.4% each). These results are parallel to another study that mentioned failure to progress (46%), non-reassuring FHR pattern (33%), and failed induction of labor (22%) as primary factors for C/S after using double-balloon for labor induction in women with unfavorable cervix.[18] Moreover, the score of labor induction factors, including dilatation, effacement, station, consistency, and position, were significantly higher ($p \leq 0.05$) in expected vaginal delivery than in cesarean delivery. In this respect, a study in France indicated that fetal station and


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cervical effacement were the only factors associated with induction success. In contrast, cervical position and consistency are unnecessary for predicting successful labor induction.[19] On the other hand, another study mentioned that multiparity status, cervical length, posterior cervical angle and BS could indicate successful labor induction but not fetal head position.[9] Consequently, in this study, parity was significant (p=0.002), and BS (especially 4 and 5) was highly significantly (p<0.001) associated with the success of labor. These outcomes are similar to that found in another study[2, 19] that observed a significant association between maternal parity and pre-induction BS with the mode of delivery. Another group showed that the success of labor induction was most likely at a BS of 8-10. They suggest using a Foley catheter and misoprostol for cervical ripening, especially when expediting delivery.[2] In contrast to our study, Navve et al. stated that labor induction in multiparous women is safe and successful regardless of the initial BS as it is not a good predictor for the success of labor induction, nor is it a predictor for maternal or neonatal adverse outcomes and complications.[8]

## Conclusions

Intravaginal misoprostol followed by intravenous Pitocin was the most successful method for labor induction, with most normal vaginal delivery among pregnant women parity in contrast to maternal age straightly associated with successful labor induction. Labor induction factors were quietly different between normal vaginal delivery and C/S. Increased bishop score is directly related to normal vaginal delivery, especially scores 4 & 5.

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## Conflict of interest

It is not declared.

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