



Assessment of prevalence on failed induction of labor and associated factors among women delivered from June –august 2016 in SPHMMC.

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ADDIS ABABA, ETHIOPIA



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**A MEDICAL STUDENT RESEARCH REPORT TO BE SUBMITTED TO THE
DEPARTEMENT OF PUBLIC HEALTH, SPHMMC IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF MEDICINE.**

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Abstract

Background: Failed IOL has become more frequent in recent years and IOL is extremely common procedure performed in all obstetrics settings. In developed countries 1 in 4 pregnancies undergo IOL. On a study done in Hawassa hospital in prevalence and associated factors in 2015, the prevalence of failed IOL was 17.3% and 20%- 40% in other cited researches. We need to know the prevalence in our setting and find or develop predictive tools when to expect an IOL who may not reach active phase is crucial to minimize the risk and cost associated with IOL failure.

Objectives: To assess and determine the prevalence and identify the associated predictive factors for failed induction of labor among women delivered in SPHMMC labor ward.

Methods and Materials: Retrospective cross-sectional study was carried out in SPHMMC from June –august, 2016, with target population being all pregnant women admitted to SPHMMC labor ward. Independent variables as Age, Ethnicity, Parity, Gestational age in week, Birth Weight, Cervical status, Indication for induction, prolonged latent phase, chronic medical illness, bad obstetrics history will be evaluated and analysis with IBM ® SPSS Statistics 20.

Results: Total number of delivery during the study period was 1666 of which 207 were selected for induction. The incidence of labour induction was 12.43 %, where 61.8% of the study group had successful induction and failed induction of labor account for 15%. The predominant indication for induction was preeclampsia/eclampsia spectrum followed by oligohydramnios and PROM. Those with Bishop Score of less than 5, 58.1% underwent Caesarean section for failed induction. Failed induction was higher in unknown date, Nulliparous and gestational age group between 37-38 and 39-40 weeks. The average time to diagnose failure of induction was 9.8 hours.

CONCLUSION: In this study it is predicted that the gravida status and Bishop Score have influence in success of labor. Unfavorable cervix result in prolonged labor, failed induction and an increased caesarean delivery rate. Rate failed induction were increased in maternal age between 20-25 range, chorioaminitis, unknown date and fetal birth weight of 2500-3kg.

Key words: Induction, Cervical favorability, labor

i. List of abbreviations and acronyms

- CI : confidence interval
- CPD : Cephalopelvic disproportion
- GA: Gestational age
- GDM: Gestational diabetes
- IOL : Induction of labor
- IUFD : Intrauterine fetal demise
- IUGR: Intrauterine growth restriction
- MSAF: Meconium stained amniotic fluid
- NRFHR: Non reassuring fetal heart rate pattern
- PROM : Prolonged / Premature rupture of membrane
- RR : Relative risk
- RH : rhesus factor (Isoimmunization)
- SSOL : Second stage of labor

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1. Introduction

Labor is the physiological process by which regular painful uterine contractions result in progressive effacement, dilatation of the cervix and ultimately leads to delivery of the fetus through the birth canal [1]. Induction of labor is one of the most commonly performed routine obstetric procedures. It refers to the iatrogenic stimulation of uterine contractions before the onset of spontaneous labor to accomplish vaginal delivery. It is associated with poorer outcomes when compared with spontaneous labor. Although the definition of labor induction is simple, criteria for successful and failed IOL have not been standardized and no consensus has been reached to date [1, 10]. Lin and Rouse [2] suggested a practical definition of failed IOL, as the inability to achieve cervical dilatation >4 cm after 12 ± 3 h of oxytocin administration. Despite the lack of specific recommendations, a definition of failed IOL which coincides in time with a low probability to achieve the active phase of labor seems to be the best option [2].

Indications for induction of labour include post term pregnancies, pre-labour rupture of membranes, maternal medical conditions like hypertensive disorders, diabetes, renal diseases etc [1]. Contraindications to labor induction are Prior classical uterine incision or transfundal uterine surgery, active genital herpes infection, placenta previa, umbilical cord prolapse, transverse or oblique fetal lie absolute cephalopelvic disproportion and Malpresentation (breech).

The risks associated with induction of labor include uterine hyperstimulation, increased rates of operative deliveries and caesarean sections, NRFHR, premature deliveries, infections in some cases and in the worst scenario may result in a uterine rupture [4]. The major risks of induction of labor at term are increased rates of cesarean delivery, especially for the nullipara with an unfavorable cervix, is clearly established in the literature and iatrogenic prematurity [1]. But this association has been challenged in recent years. A Cochrane review concluded that cesarean section rates and assisted vaginal delivery rates are not increased by IOL at term [2]. Macer et al conducted a retrospective review of more than 500 women who either underwent induction of labor or spontaneous labor at term. They found that the rate of cesarean delivery did not differ among induction and spontaneous labor groups regardless of initial cervical status in multiparous subjects. For nulliparous women with an unfavorable cervix undergoing induction, however, the cesarean delivery rate was 50 percent compared with 22 percent in the spontaneous labor group (relative risk [RR] 2.48 95-percent confidence interval [CI] 1.27 to 4.87) [1].

Failed induction is a complex network of physiological and anatomical factors lying in mother and baby and causes of failure are many, and rate is rising day by day. The induction of labour and its failure is a

concern for all health care professional and accurate prediction of failure is still a difficult task for the obstetrician [3].

Another important aspect to consider is that failed IOL diagnosis at a given time point does not always involve the performance of an immediate cesarean section in all centers. This can be explained by several studies which have shown that, continuing the induction process beyond a failed IOL diagnoses at a given time point will lead to vaginal delivery in a considerable number of cases. Women who progressed into active labor within 12 h had a 67–86% probability of achieving vaginal birth, whereas only 31–33% of women who reached active labor after 18h had a vaginal delivery [1, 2, 11]. This showed the importance of allowing enough time to progress from the latent phase of labor to the active phase.

The definition of failed induction should be derived from what is known about the pattern of labor progression in women undergoing induced labor who ultimately achieve vaginal delivery. The goal is to minimize the number of cesarean deliveries performed for failed induction in patients who are progressing slowly because they are still in the latent phase of labor. Once induced women enter active labor, progression should be comparable to progression in women with spontaneous active labor, or faster [1].

The condition of the cervix greatly influences the success of inducing labor. Cervical ripening is a complex process that results in physical softening and distensibility of the cervix, ultimately leading to partial cervical effacement and dilation. Cervical ripening methods fall into two main categories: pharmacologic and mechanical. Pharmacologic methods are oxytocin, prostaglandins, Estrogen, relaxin and progesterone receptor antagonists, but the commonly used are oxytocin and prostaglandins. Mechanical methods include Membrane stripping, amniotomy, laminaria tents and transcervical balloon catheters With/without extra-amniotic saline infusion

The modified Bishop score is the system most commonly used in clinical practice to evaluate the cervix before induction. This system tabulates a score based on the station of the presenting part and four characteristics of the cervix: dilation, effacement, consistency, and position .Because the state of the cervix plays such a crucial role in labor induction, a cervical examination is essential before determining which method to use for labor induction. The higher the Bishop score, the more “ripe” or “favorable” the cervix is for labor induction. A low Bishop score, usually considered 5 or less, is “unripened” or “unfavorable” and will benefit from cervical ripening. A low Bishop score is particularly predictive of failure in nulliparous women who undergo induction of labor at term.

2 The Statement of the problem:

The incidence of induction varies from setting to setting ranging from 9-40% and prevalence of failed induction labor range from 17%-60 %. Reason behind this is unclear literatures suggest may depends upon the institutional protocol or method of induction. Also predicting factor vary from center to center. The induction of labour and its failure is a concern for all health care professional and accurate prediction of failure is still a difficult task for the obstetrician. In SPHMMC, induction of labor is a commonly performed procedure but there is a limitation in undertaking a study on the magnitude and factors associated with its failure.

Different research been done in Saint Paul's hospital on Success of Induction but not on its failure. So till date the prevalence of induction, its failure and it predicting factors in SPHMMC is unknown. Its success and failure is difficult to predict before administration of the procedure. This study aimed to identify the prevalence and predictors for failed induction by a 3 month retrospective study of the procedure and it is effect on labour outcome in Saint Paul's Millennium medical college. Despite the large number of studies conducted, no good predictive factors were found to successfully identify the group of patients who will not respond to physical or pharmacological induction, and hence achieve the active phase of labor. Almost all researches associated cervical status before induction and measure as cervical ripening have been developed to make the success of induction high and this study will help to clear factors that are also associated in our setting and develop strategies to tackle them.

Significance of the study

The purpose of this study is to produce important information on the prevalence of failed IOL among woman admitted in labor ward and associated factors. There is no similar study conducted in the area, it can contribute a lot as baseline information for future studies. Once such information is obtained from the study, one can keep in mind its impact on increasing the rates of operative delivery. Strategies for developing practice guidelines may help to prevent unwarranted case selection and help to reduce the current high operative delivery rates.

3 LITERATURE REVIEW

3.1 Worldwide situation

Vaginal delivery is the goal of the induction process; however, this occurs less often than when women labor spontaneously. There are currently no standards of what constitutes a failed induction. It is important for the clinician to recall that cervical ripening itself can take some time, and that the development of an active labor pattern should be achieved before the determination that the induction has failed. An Australian researcher evaluated a group of 978 nulliparous women after either artificial or spontaneous rupture of membranes to determine factors that could predict failed induction. There was a direct correlation between increasing duration of the latent phase and the probability of cesarean birth. After 10 hours of oxytocin administration, the 8% of women not in the active phase of labor had an approximately 75% chance of being delivered by cesarean for failed induction; after 12 hours of oxytocin administration, the chance of cesarean was almost 90%. There was a linear relationship between lack of cervical dilation and cesarean birth. The authors concluded that the continuation of oxytocin after amniotomy for women who had not yet reached at least 4 cm dilation was not unreasonable, but that beyond 12 hours, the benefit was unclear [1]. Adverse outcomes related to the length of latent phase have not been extensively evaluated, although some studies have related a prolonged latent phase with subsequent labor abnormalities and the need for caesarean section [2,12]. Whereas NB Khan et al commented in their report that not only the prolonged latent phase of labour is responsible for a failed induction, but other factors, those related to this are null parity and poor Bishop score [2,11]. To find or develop predictive tools to identify those women exposed to IOL who may not reach the active phase of labor is crucial to minimize the risks and costs associated with IOL failure while opening a great opportunity for investigation [2].

Cervical status, mainly measured by the Bishop Score and parity, has been shown to be the main predictor of successful labor induction [2, 13, 14]. As prelabor cervical status has been recognized as the most important predictor of induction success, Teixeira et al. [2, 15] also concluded that the Bishop score still seems to be the most accurate predictive factor of vaginal delivery after IOL. On the other hand, Kolkman et al. [2, 16] showed that a Bishop score of 4, 5 or 6 was a poor predictor of IOL success. For the prediction of cesarean delivery, the sensitivity and specificity of a Bishop score ≤ 6 was 78 and 44%, respectively, and of a Bishop score ≤ 9 was 95 and 30%. The sensitivity

and specificity of cervical length in the studies included in that review were 56–66% [16] and 83–75% [18], respectively. Cervical length was found to be an independent predictive factor in 2 of the studies included in this review [16, 18]. There is an association between the Bishop score and cervical length and IOL outcome, but this relation does not always result in a good predictor and clinical risk factors themselves have a too low predictive value to be translated into a useful clinical tool. In contrast, cervical status remains the most important predictor of IOL outcome, Similarly N Banos documented, although the value of the parameters explored to date is limited. Other predictors such as maternal age, weight, height, body mass index, ethnicity and socioeconomic status have been reported as similar as Corine J. and Rayamajhi RT identified in a study [2]. Obstetric and medical history such as gestational age at delivery, birth weight and amniotic fluid index have also been described [19]. Earlier gestational age was found to be a significant predictive factor for failed IOL [18]. Maternal Characteristics However, no significant relationship was found between maternal age and IOL outcome in the studies reviewed [2].

A study was conducted at a tertiary care hospital of Odisha, India, the induction rate is 13.5% and the caesarean section percentage found in this study is 50.5%, failure is considered from mode of delivery [3]. The failure rate in this study is supported by D J Rouse, who claimed 61% of caesarean delivery with latent phase duration of 12 hours after induction [3...20]. Similarly Rouse DJ and Hauth J s revealed 87% caesarean rate after induction compared to 41% in Simon and Grobman's study [3, 21, 22]. It was reported to be 23.4% in a Dutch study, 16.8% in a UK based study, 12% in a Turkish study, 37.6 in Nigerian study [5]. The major reason for caesarean were failed induction by non-progress of labour, fetal distress, CPD and meconium staining liquor. In this study it is predicted that the gravida status, number of doses and Bishop score have influence in success of labour.

The incidence of labour induction was 34.6% in Kathmandu Medical College, study done by Rayamajhi RT [5]. Nulliparas formed the larger part of the study group with a higher incidence of failed induction compared to multiparas. Maternal age was another variable analyzed as a risk factor for failed induction. Women above 30 years had a higher failure rate compared to those aged 30 years or less in whom 28.2% had failed induction. In the group with a Bishop score of less than 5 at the initiation of induction, 40.8% underwent Caesarean section while those with a score of more than 5 required Caesarean section in 24.1 %. Hence, out of the total failures, the 0-5 Bishop

Score group accounted for the majority of failures. In this study, there is ample evidence that operative delivery is significantly higher with induced labour compared with those who enter labour spontaneously, especially high failure rates in the nullipara with an unfavorable cervix.[5,,24,25,26,27].

The Aga Khan University Hospital in Pakistan had 18.1% failed induction rate [6]. Failed induction rate was 4.6 times higher in nulliparous patients compared to their multiparous counterparts. Similarly women undergoing Caesarean section were significantly more likely to have gestational age more than 40 weeks. It was also observed that women having failure of induction were 2.5 times more at odds of having macrosomic babies than patients with successful inductions. The results suggest that women undergoing Caesarean section had significantly higher chance of having previous bad obstetric history than women having vaginal deliveries. A significant association between Bishop Score and failed induction was also noted. Rate of induction failure was 1.9 times higher in women with Bishop Score of 5 or less versus in women with favorable cervix [6].

3.2 Ethiopian situation

The prevalence of failed induction of labor was 17.3% Among Women Delivered in Hawassa Public Health Facilities [4], which is greater than the study done in Health Resource Poor Settings [4....23]. This difference may be due variation in commonly used methods for induction of labor. Advanced maternal age, Null parity, poor Bishop Score, greater for gestation, bad obstetric history, post term premature rupture of membrane, were significantly associated with failed induction of labor. Reasons for cesarean section among women were: Cephalopelvic disproportion, fetal distress and failure of induction. Odds of failed induction were 3.11 times more likely in Primiparous mothers than multiparous. This finding, is supported by the study done by Ramayahji RT, et al. [4,5] and the finding of N. Khan, et al.[4].; the odds of failed induction were 9.21 times more likely in mothers with age greater than 30 years than others, which is supported by the study done in Kathmandu Medical College [4,5]; the odds of failed induction were 4.54 times more likely in mothers with pre-induction bishop score of less than five than those with pre-induction bishop score of greater than five [4]. The finding of this study shows that inducing of labor should better be performed at favorable cervix for a good outcome.

4 OBJECTIVES

GENERAL OBJECTIVE:

To assess and determine the prevalence and identify the associated predictive factors for failed induction of labor among women delivered in SPHMMC labor ward.

SPECIFIC OBJECTIVE:

1. To assess the prevalence of induction of labor at SPHMMC from June to august 2016
2. To determine the prevalence of failed induction of labor at SPHMMC from June to august 2016
3. To assess common indication of labor induction and causes of cesarean section in SPHMMC
4. To identify the predictive factors and analyze the clinical variables associated with induction of labor failure.
5. Evaluate the time require to diagnose failed induction of women on induction in SPHMMC

5 METHODS AND SUBJECTS

5.1 Study area

The study was conducted in SPHMMC; which has labor ward. The area is selected because it is the second largest central referral hospital in Ethiopia that provides service for patients referred from all over the country. The Hospital was built by Emperor Haileselassie I in 1969 G.C as a source of medical care for underserved populations. The first postgraduate programs was launched in 2012 with departments of OBS & GYN. The department manages one Labor ward and Gyn/obs emergency each and two maternity and one gynecology ward. The labor ward has 4 beds, 8 delivery couch, 1 Operation Theater and recovery room each.

5.2 Study design:

A Retrospective analytic cross-sectional study

Study period

- The data collection was conduct from June –august, 2016.

Target population:

- All pregnant women admitted to SPHMMC labor ward who are candidate for induction of labor.

Study population / Study unit:

- All pregnant women admitted and Induction procedure applied in SPHMMC labor ward.

5.3 Inclusion & Exclusion Criteria

□ Inclusion criteria: - Singleton pregnancies beyond 28 weeks with vertex presentation requiring induction of labour. Induction was considered successful if the patient delivered vaginally and failed if the main or secondary outcome was failed IOL, defined as not entering the active phase of labor after administration $\pm$ 8h of oxytocin infusion after maximum dose or failed to progress even though there was good dilatation and contraction and either of which ended with caesarean section.

□ Exclusion Criteria: - Major reason for caesarean section other than describes above as fetal distress, CPD and meconium staining liquor etc.

5.4 Variables

A. Dependent Variable

- IOL outcome

B. Independent variables

- Age, Ethnicity, Parity, Gestational age in week, Birth Weight, Cervical status, Indication for induction, prolonged latent phase, chronic medical illness, bad obstetrics history.

5.5 Data management

Data quality

Questionnaire was first prepared in English language by the investigator and later data collected from patient charts accordingly. Prior to the actual data collection questionnaire was tested on five percent of similar population. Data collectors were the investigator and two other two medical students who were oriented on the research before the data collection. During the actual data collection process investigator was cross checking the data for completeness.

Data collection method

Patients card number who have been induced from June to august 2016 was collected from labor ward HMIS. Data was collected from medical records of women for whom induction of labor was performed in SPHMMC. Data was filtered and enter onto a questionnaire.

Data analysis

Data imported into IBM SPSS 20 and descriptive statistics was computed, Analyses performed with Chi-square test for categorical variables. Then, binary logistic regression analysis was done to evaluate the possible association of all variables that were candidate. Finally the result is summarized and presented in texts and charts.

Ethical consideration

During data collection, all methodological and ethical considerations was taken care of. Informed consent was obtained from the Medical College and Ethical clearance letter was obtained from ethical review board. Regarding some areas, which require confidentiality, the confidentiality& anonymity of the subjects, is strictly protected only the data available on the patients file is used.

Dissemination of results

The results of this study will be disseminated to SPHMMC Public health department, gyne/obs department and concerned bodies as Minister of health, policy makers and other concerned stake holders.

6 OPERATIONAL DEFINITION

- Effacement: also called cervical ripening, refers to a shortening of the cervix.
- Cervix: Cylindrical shaped neck of tissue that connects the vagina and the uterus.
- Iatrogenic: illness induced inadvertently by a physician, treatment or diagnostic procedure
- Oxytocin: a drug/human peptide hormone used to induce or augment labor
- Operative delivery: the use of forceps or vacuum device to extract the fetus from the vagina.
- Cesarean section: delivery of a baby through a surgical incision in the abdominal wall and uterus.
- Premature (prematurity): delivery before 37weeks of gestational age.
- Parity: number of times a female has been pregnant and carried it to a viable gestational age.
- Primigravida: First pregnancy and no previous abortion
- Primiparous: Delivered one baby
- Gestational Age: measured in weeks from first day of the woman's last menstrual cycle to current date.
- Latent phase: The initial phase of labor which begins at the point the woman perceives regular uterine contraction.
- Bad obstetrics history: Occurrence of three consecutive pregnancy losses.
- Ripening: Procedure to make the cervix favorable
- Singleton : a pregnancy where uterus contain only one fetus than multiple.
- Induction: iatrogenic stimulation of uterine contractions before the onset of spontaneous labor
- MODIFIED BISHOP SCORE

Score	0	1	2	3
Parameter				
Dilation (cm)	Closed	1-2	3-4	5 or more
Length* (cm)	>4	2-4	1-2	1-2
Station	-3	-2	-1 or 0	+1 or +2
Consistency	Firm	Medium	Soft	
Cervical position	Posterior	Midposition	Anterior	

Result

The labor room statistics shows the total number of delivery during the study period was 1666 of which 207 were selected for induction of labor, giving an incidence of labor induction of 12.43 %. Of the 207 cases, 121(58.4%) underwent vaginal deliveries and 7 (3.4%) had instrumental deliveries. Hence, 128 (61.8%) of the study group had successful induction. 79 cases from the study group required Caesarean sections giving a failure rate of 38.2%, which failed induction of labor account for 15% (n=31). Of the cases that underwent Caesarean sections, 31 (39.2%) were for failed induction, 4(5.1%) each for CPD and MSAF, 25(31.7%) for foetal bradycardia, 11(13.9%) for tachycardia, which makes a total of 40(50.6%) for foetal distress.

Nulliparous (n=116) formed the larger part of the study group accounted for 56% of total induction population, followed by 21.3% (n=91) multiparous. Nulliparous had an incidence of 67.7% (n=21) failed induction, while in multiparas is 9.7% (n=3). No association was found between Parity and failed induction of labor (p=0.267).

Majority of the population is formed by the Oromo (n=89) and Amhara (n=81) ethnicity, 43% and 39.1% respectively. Followed by others as Gurage (n=21), Silte (n=14) and Tigre (n=2). Almost all mothers were married (98.1%), with only 4 cases of single mother in the sample. No association was found between ethnicity and failed induction of labor (p=0.79).

The women were mostly between 20-25 years, accounting for 44% of mother's labor's induced followed by 26-30 (31.9%). The mean age of the population was 23.7 of age. Maternal age was another variable analyzed as a risk factor for failed induction. Women b/n 20-25 years (n=92) had a higher failure rate (n=14, 45.2%) compared to those aged above 30 years (n=41) in whom 29% (n=9) had failed induction. No association was found between age and failed induction of labor (p=0.137)

The cervical was favorable in most (78.7%, n=163) of the cases. From total mothers 138 (66.7%) of them have undergone cervical ripening to make the cervix favorable. In the group with a Bishop score of less than 5 at the initiation of induction, 40.9% (n=18) underwent Caesarean section for failed induction (58.1% & 8.7 % from total failed induction group & total sample respectively), while those with a score of more than 5 (n=163) required Caesarean section in 8 % (n=13) (41.9% from total failed group, 6.3% from total sample). Association was found between cervical status and failed induction of labor (p=0.00). Bivariate regression was done and crude odds ratio was 8 (95% CI).

About 36.3 % babies were above 3 kilogram and 24.2% babies were from 2.5-3 kilogram which is the highest in the population. The small number of cases seen were birth weight more than 4kg. Foetal birth weight of the study group was also analyzed. The least rate for failure was seen in both extreme weight

<1500gm (n=13) and >4000gm (n=6), where 0.0% and 3.2% were diagnosed as failed induction. Of the babies with 1500gm-1999gm (n=31) and 3000gm- 3499gm birth weight (n=49), failure was 22.6 % each, and babies with 2000-2499g (n=38), 2500-2999 (n=50) and 3500-3999 (n=19) failure was 16.1%, 29% and 6.5% respectively. No association was found between birth weight and failed induction of labor (p=0.613).

The predominant indication for induction was preeclampsia/eclampsia spectrum which account for 48.3% (n=100) followed by oligohydramnios and PROM each account 11.1% (n=23). Post term and chorioaminitis was the indication in 6.8% (n=14) each, other 6.3% (n=13), IUFD 3.9% (n=8) IUGR in 1.4 % (n=3) while 1.9 % (n=4) had a history GHTN and there was only two (1%) case of gestational diabetes in the study group. Highest failure rate seen in indication for chorioaminitis accounting 21.43% from all induced chorioaminitis and 1.5% from total induction population, Followed by Preeclampsia/eclampsia spectrum (18%) and 8.7% from total induction making it the highest number. No association was found between Indication of induction and failed induction of labor (p=0.865)

Pregnancy with unknown date make majority of the induction group 34.3% (n=71) followed by GA b/n 39-40 (n=34) and 35-36 weeks (n=30), with incidence of 16.4% and 14.5% respectively. Gestational age 42week and more were the lowest in number with only 10 cases seen (4.8%). The outcome of induction was also analysed according to gestational age of the patients. Failed induction was higher in unknown date (n=9; failure rate: 29%) and gestational age group between 37-38 and 39-40 weeks (n=11; failure rate: 35.5%) both combined. At 28-34 weeks pregnancy (n=3) and 41- 42 weeks (n=3) the failure rate was 9.7 % each. While the lowest rate of failed induction was seen in Postterm pregnancy 3.2% (n=1). No association was found between gestational age and failed induction of labor (p=0.98).

There were 25 cases of chronic illness identified. Highest rate (5.3 %) identified to be chronic hypertension with 11 cases followed by hepatitis and HIV/AIDS with 1.5% each (n=3). There were only 1 cases of Diabetes, malignancy and cardiac illness identified in the sample. There were 6.3% case of BOH (n=9) identified in their previse pregnancy. No association was found with any chronic illness and failed induction of labor (p=943).

The length of time for failure of induction was diagnosed on average (mean) of 9.8 hours. Minimum hour passed on induction before caesarean section was 1 hour and maximum of 14hours. There are 16 cases where c/s was done for indication other than failed induction even though it has passed the 8hr mark protocol set by the labour ward SPHMMC institution. If failed induction was diagnosed it would have raised the incidence from 15% to 22.7%, giving a marginal difference of 7.7%.

The Apgar scores of the new-borns at first minute was good with 61.8% (n=128) having a score more than 7, 27.1% (n=56) with intermediate score and only 6 cases had score 4 and less (2.9%). Their fifth minute

Apgar is better with 84.1% (n=174) and only 1 case (0.5%) with low score of 4 or less. 17 cases had Apgar of 0, which IUFD was the indication initially.

Table 2: Indications for induction of labor in SPHMMC labor ward

Indication	N	Percent
POSTTERM	14	6.8
IUFD	8	3.9
IUGR	3	1.4
GDM	2	1.0
PREECLAMP SIA- ECLAMPSIA	100	48.3
OLIGOHYDRA MINOS	23	11.1
MEDICAL- CAUSE	2	1.0
CHORIOAMNI TIS	14	6.8
other	13	6.3
GHTN	4	1.9
RH	1	.5
PROM	23	11.1

Figure 1: Frequency of indication for cesarean section in SPHMMC from June to august 2016

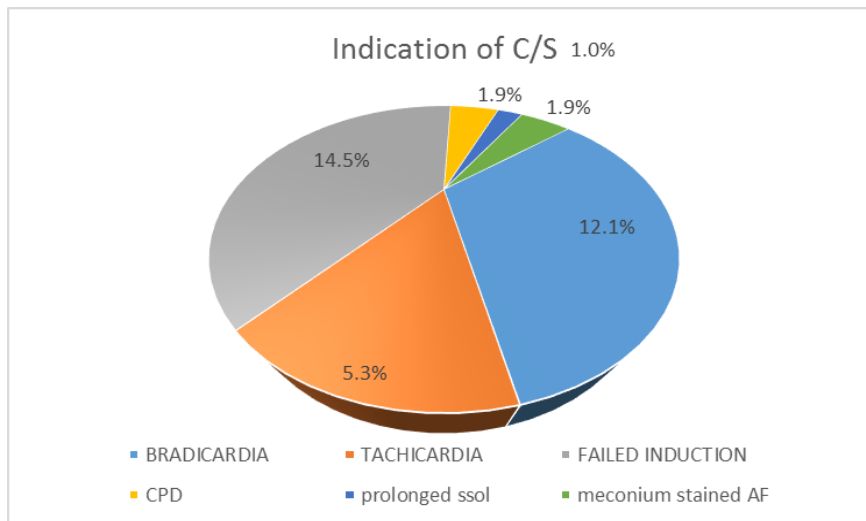


Figure 2: Showing frequency on method of delivery of women on induction

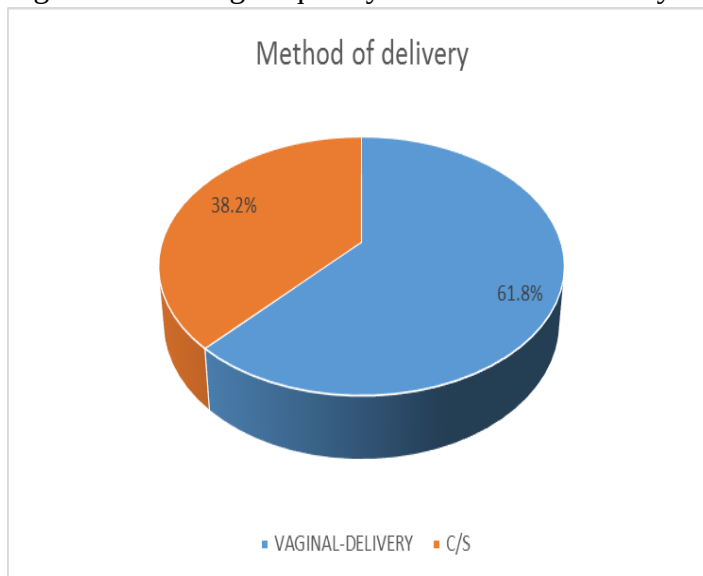


Table 3: Statically association of variables and failed induction of labor. Bivariate analysis of cervical status with 95% CI

		Failed induction		p-value	COR (95% CI)	
		Yes	NO			
Age	<=19	1	7	0.137		
		3%	4%			
	20-25	14	78			
		45.20%	44.30%			
	26-30	7	59			
		22.60%	34%			
31-35		6	20			
		19.40%	11.40%			
	>35	3	12			
		9.70%	6.80%			
Ethnicity	AMHARA	12	69	0.958		
		38.70%	39.20%			
	OROMO	13	76	0.792		
		41.90%	43.20%			
	GURAGE	3	18	0.917		
		9.70%	10.20%			
	SILTE	2	12	0.94		
		6.50%	6.80%			
	TIGRE	1	1	0.163		
		3.20%	0.60%			
Parity	Nulliparus	21	95	0.155		
		67.70%	54.00%			
	Primiparus	7	36	0.731		
		22.60%	20.50%			
	Multiparus	3	41	0.087		
		9.70%	23.30%			
	Grandparus	0	4	0.397		
		0.00%	2.30%			
cervical status	unfavourable	18	26	0	7.988	
		58.10%	14.80%			
	favourable	13	150			
		41.90%	85.20%			
Indication	Prom	4	19	0.618		
		12.90%	10.80%			

Postterm	1	13	0.349
	3%	7%	
IUFD	0	8	0.174
	0.00%	4.50%	
IUGR	0	3	0.395
	0.00%	2%	
GDM	0	2	0.57
	0.00%	1.10%	
Preeclamsia-eclams	18	82	0.384
	58.10%	46.60%	
Oligohydraminos	4	19	0.646
	12.90%	10.80%	
Medical cause	0	2	0.551
	0.00%	1.10%	
Chorioaminitis	3	11	0.188
	9.70%	6.20%	
GHTN	0	4	0.397
	0.00%	2.30%	
RH	0	1	0.551
	0.00%	0.60%	
Other	1	12	0.94
	3.20%	6.80%	
Birthweight <1500	0	13	0.118
	0.00%	7.40%	
1500-1999	7	24	0.165
	22.60%	13.60%	
2000-2499	5	33	0.728
	16.10%	18.80%	

Discussion

Induction of labor is one of the fastest growing medical procedures in current obstetric practice; beneficial and safe in high risk pregnancies when the benefits of early delivery outweigh the risk of continuation and a common procedure in this hospital. The process of induction of labor requires the intervention of a skilled birth attendant to prevent undue morbidity and mortality. While the induction rate in our institution was 12.4%, a Singapore based study has reported a rate of 10% and 11.5% in Osaheni study in Nigeria. The failure rate of 15% in this study is supported by UK, Turkish based study (5) and almost similar results of study done in Hawassa hospital (17.3%) (4). While study done in India, failure rate was around 50% , 61% in Dj Rouse study, and range between 23%- 43% in other reviews (3, 20,21,22). This difference may be due variation in commonly used methods for induction of labor, in which oxytocin infusion was the predominantly used method in this study while in the other cases misoprostol is alternative. Given the significantly elevated risk for caesarean delivery, induction of labor in nulliparous women should be approached with caution. There is ample evidence that operative delivery is significantly higher with induced labor compared with those who enter labor spontaneously with specially, high failure rates in the nullipara with an unfavorable cervix (5) (6). The primigravidas were the major dominating population of the labor room, while most authors have noted that increasing parity had a favorable bearing on the outcome of induction. In this study nulliparous with a higher incidence of failed induction (67.7%, n=21) compared to multiparas (n=3, 9.7%). Failed induction rate was 7 times higher in nulliparous patients compared to their multiparous counterparts. Neelofur study in Aga Khan Hospital, failed induction was 4.6 times more likely in nulliparous patients compared to their multiparous counterpart (6) and in hawassa study odds of failed induction were 3.11 times. Alberico et al have reported a failure rate in multiparas to be as low as 5.7% with significantly shorter labor while an Austrian and a US based study also cite primiparity significantly reducing the probability of successful induction compared with multiparity (5). The higher failure rate in the present study may be due to the higher proportion of primiparous women in the study. But there was no association found b/n parity and failed induction in this study ($p=0.267$).

The major reasons for which induction was done were preeclampsia eclampsia spectrum, oligohydramnios and PROM, which is more similar to study done in KMCTH where Posterm, PROM, hypertensive disorders and oligohydramnios were common indications. Study done in Hawassa common indications were premature rupture of membrane, Preeclampsia, greater

gestation and in KwaZulu-Natal, South Africa the three main indications for induction were hypertensive disorders, postterm and PROM (4). The Post dates, GDM, IUGR and IUFD responded well to induction by resulting more numbers of vaginal deliveries. Oligohydramnios, chorioaminitis and PROM responded poorly to the procedure. Highest failure rate seen in indication for chorioaminitis accounting 21.43% from all induced chorioaminitis and 9.68% from total induction population making it less likely to respond for induction. Similarly Tripathy reported oligohydramnios has poor prediction and postdate as good predictor for successful vaginal delivery after induction of labor (3). No significant association was noted b/n any indication and failed induction.

The condition of the cervix at the start of induction is an important predictor, with the modified Bishop score being a widely used scoring system. The most important element of the Bishop score is dilatation (6). The bishop score measurement is based on subjective assessment which has low credibility due to its inaccuracy in interpretation, need for experience and inability to collect full data on cervical status for bishop score calculation. Similarly Corin J V expressed their inability to collect the data regarding cervical position and consistency and calculating the bishop score for all patients (28). This study did not consider the cervical status before cervical priming administration, rather it considered the cervix as a whole before induction started, irrespective of priming applied or not. An unfavorable Bishop score has been amply documented as being the predominant risk factor for a caesarean delivery for failed induction as was seen in this study. Dwivedi have reported 45.7% induction failures and Bishop Score 0-5 group accounting for 67.5% of total failures compared to 15% failures in this study which constituted 58.1% of total failures. Hence, out of the 31 failures, the 0-5 Bishop Score group accounted for the majority of failures. A significant association between Bishop Score and failed induction was also noted. Rate of induction failure was 5.1 times higher in women with Bishop Score of 5 or less versus in women with favourable cervix and the having odds ratio of 8 times for failure. In Hawassa study the odds of failed induction were 4.54 times and Neelofur documented the odds of failed induction were 1.9 times more likely in women with Bishop Score of 5 or less (6). The finding of this study shows that the risk of induction failure in our institution for unfavorable bishop is higher and inducing of labor should better be performed at favorable cervix for a good outcome. It also supports the scientific findings of different literatures that the condition of the cervix at the start of induction is an important predictor.

Timely onset of labor and delivery is an important determinant of maternal and perinatal outcome. Both preterm and post term births are associated with higher rates of perinatal morbidity and mortality than pregnancies delivered at term. Gestation age has been reported to be associated with the success or failure of IOL (6). In this study, caesarean sections were less in number in Postterm deliveries and highest failure rate in unknown date, where Neelofur and Hawassa study says otherwise, in their study, caesarean sections were 1.5 times more likely and odds of failed induction were 6.57 times more likely in women with greater for gestation than others respectively (6,4). But this result is contrary to the existing literature and a meta-analysis of 19 randomized trial showed routine labor induction at > 41 weeks of gestation to be associated with no significant increase in the caesarean birth rate (6). In this study no significant association was found b/n GA and failure of induction ($p=0.980$). Preterm women are also one of the identified groups with high induction failure (29). However this study results are in contrast to these findings with a weak association of preterm delivery with failed induction.

Higher birth weights increase the risk of failed induction including an increased caesarean delivery rate, as stated by Neelofur (6) (failure of induction were 2.5 times more at odds of having macrosomic babies than women with successful induction) and other cited literature, but in contrary in this study higher birth weight and also lower extremes lower in number as a cause of failed induction, yet no significant found between birthweight and failure of induction.

Various methods have been recommended for induction of labor such as intracervical Foleys balloon, prostaglandin E2 and I/V Oxytocin etc. In our institution we inserted intracervical Foleys balloon for cervical ripening followed by ARM and I/V oxytocin. Foleys catheter application is a safe and effective method for cervical ripening. This study did not include comparison between different methods of induction of labor. However result shows the Foley catheter as an effective method bringing about cervical changes.

CONCLUSION

The failure rate of induction with caesarean section is rising day by day. The prevalence of induction in SPHMMC is 12.43% and prevalence of failed induction of labor is 15%. Though it is understood that labor induction is not a definite cause of caesarean section, still in this study it is predicted that the gravida status and Bishop score have influence in success of labor. Induction in the setting of an unfavorable cervix especially in the nulliparous woman can result in prolonged labor, failed induction and an increased caesarean delivery rate with fetal distress accounting for only a minority of failures. Other variables not associated but higher rate for failure of induction were maternal age between 20-25 range, chorioaminitis, unknown date and fetal birth weight of 2500-3kg. Successful induction was more likely when initiated at Postterm GA, and both extreme weight <1500gm and >4000gm. Indications aside, induction of labor correlates with higher operative delivery rates compared with those with spontaneous onset of labor. In conclusion poor Bishop Score had strongest and the only association found with failed IOL in this study. It's still difficult to set optimal time to diagnose failed induction in SPHMMC, since in some pregnancy the 8 hour mark set by our labor ward protocol has been passed.

Recommendation

It would seem prudent to maintain a cautious approach when deciding for an induction, avoiding the procedure unless it is definitely warranted in order to prevent unnecessary increase in operative deliveries. The most important point is to make sure Pre- induction cervix is favorable and patients with PROM, looking for ways to make the cervix favourable before induction is undertaken in the least risk manner (aseptic technique) so that the prevalence of failure decrease.

It's important to come to an agreement to stick with the labor ward protocol on time limit to diagnose failed induction, so that a strong recommendation can be withdrawn from researches on risk and benefit after certain hours on induction.

I recommend further multicenter, prospective studies of a larger sample size to have a better understanding of factors leading to failure of induction of labor.

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Thank you!

Annexes: Research questionnaire (Data collecting sheet)

Card number _____

1) AGE

1. ≤ 19
2. 20-25
3. 26-30
4. 31-35
5. > 35

2) ETHNICITY

1. Amhara
2. Oromo
3. Gurage
4. SNNP
5. Silete
6. Tigre
7. Other

3) MARRITAL STATUS

1. Single
2. Married
3. Divorced

4) PARITY

1. Nulliparous
2. Primiparus
3. Multiparous
4. Grand multiparous

5) GESTATIONAL AGE

1. 28-34
2. 35-36
3. 37-38
4. 39-40
5. 41-42
6. > 42
7. Unknown date

6) BIRTH WEIGHT

1. <1500
2. 1500-1999
3. 2000-2499
4. 2500-2999
5. 3000-3499
6. 3500-3999
7. > 4000

7) CERVICAL STATUS

1. Unfavourable
2. Favourable

8) INDICATION

1. Prom
2. Postterm
3. IUFD
4. IUGR
5. GDM
6. Preeclampsia-eclampsia
7. Oligohydramnios
8. Other
9. GHTN
10. RH

9) CHRONIC ILLNES

1. Hypertension
2. Diabetes
3. Asthma
4. Malignancy
5. Cardiac
6. Other
7. None
8. Hiv
9. Hepatitis

10) BAD OBSTETRICAL HISTORY

1. Yes
2. No

- 11) CERVIX RIPPED
1. Yes
 2. No
- 12) OUTCOME
1. Vaginal delivery
 2. c/s
- 13) FAILED INDUCTION
1. Yes
 2. No
- 14) INSTRUMENTAL DELIVERY
1. Yes
 2. No
- 15) CESEAREAN SECTION INDICATION
1. Bradicardia
 2. Tachicardia
 3. Failed Induction
 4. CPD
 5. Cervical Arrest
 6. Prolonged ssol
 7. MSAF
 8. None
- 16) APGAR 1ST MINUTE _____
- 17) APGAR 5TH MINUTE_____
- 18) DURATION OF INDUCTION _____