Failed induction of labor and associated factors among women delivered in Hawassa Public health facilities, SNNPR, Ethiopia

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Jimma University College of Health Sciences, department of Nursing and Midwifery

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Abstract

Background: Induction of labor is an increasingly being done obstetric procedure throughout the world. It is carried out in approximately 20% of all pregnancies. It is associated with poorer outcomes when compared with spontaneous labor.

Objective: To determine the prevalence of failed induction of labor and identify associated factors in Hawassa public health facilities, SNNPR, Ethiopia.

Method: institution based cross sectional study was carried out on medical records of 294 women admitted for induction of labor in Hawassa public health facilities from 1st Jan, to 31st Dec, 2014. Systematic sampling technique was used to select samples. Six diploma nurses were hired to collect the data. Data were collected by pretested structured checklists then entered into Epi-Data version 3.1 to control data entry errors. Then data were analyzed with Statistical Package for Social Science, version 21. First percentage, frequency and mean were calculated. Then, multivariable logistic regression analysis was done to evaluate the possible association of all variables that were candidate after binary logistic regression analysis. P-value less than 0.05 in multivariable logistic regression was considered to be statistically significant. Finally the result was summarized and presented in texts and charts.

Result: The prevalence of failed induction of labor was 17.3%. Advanced maternal age [AOR 8.85 (2.60-30.05)], primiparity [AOR 3.12 (1.01-9.62)], poor Bishop Score [AOR 4.42 (1.52-12.84)], greater for gestation [AOR 7.21 (2.45-21.19)], bad obstetric history [AOR 5.64 (1.38-23.02)], post term [AOR 4.34 (1.17-16.11)] and premature rapture of membrane [AOR 7.12 (2.83-17.89)] were significantly associated with failed induction of labor.

Conclusion and recommendation: advanced age, primiparity, unfavorable bishop score, premature rapture of membrane, greater for gestation and bad obstetric history had positive association with failed induction of labour. Women with increased risks for failure of induction of labor should be approached with caution.

Keyword: Induction of labor; failed induction; Caesarean section

Acknowledgment

Contents

IV

List of tables

List of figures

List of Abbreviation and acronym

- **ACOG**   American College of Obstetricians and Gynecologists
- **ARM**   Artificial Rupture of Membranes
- **BMI**   Body mass index
- **CI**   confidence intervals
- **CS**   Cesarean section
- **DM**   Diabetes Mellitus
- **ICU**   Intensive Care Unit
- **IOL**   Induction of labour
- **IUGR**   Intrauterine Growth Retardation
- **MDGs**   millennium development goals
- **NICHD**   National Institute of Child Health and Human Development
- **PGE**   prostaglandin E
- **PIH**   pregnancy induced hypertension
- **PROM**   Pre-labor or premature Rupture of the Membranes
- **SPSS**   Statistical Package for Social Scientists
- **SVD**   Spontaneous vaginal delivery
- **WHO**   World Health Organization

Chapter 1: Introduction

1.1.   Background

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 labour is defined as an intervention designed to artificially initiate uterine contractions leading to progressive dilatation and effacement of the cervix and birth of the baby (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, fetal compromise, chorioamnionitis, abruptio placenta, intrauterine fetal death and others The risks associated with induction of labour include uterine hyperstimulation, increased rates of operative deliveries and caesarean sections (in those that undergo induction), fetal heart rate pattern abnormalities, premature deliveries, infections in some cases and in the worst scenario may result in a uterine rupture (3).

The commonly known contraindications are Malpresentations, malposition. Macrosomia, prior uterine scar, active genital herpes infection and Condylomma, fetal compromise, complete placenta previa, multiple gestation, any contraindication to vaginal delivery, hyperkinesias, fetal distress, uterine rupture, failure of induction, water intoxication and increased incidence of neonatal jaundice with excessive use of oxytocin (4).

Elective induction of labor takes place when a mother wishes to deliver at a particular time usually after term. However, it is recommended that induction of labour be done for medical and obstetric reasons only due to risks associated with the procedure (5).

Successful labor induction is clearly related to the state of the cervix. Women with an unfavorable cervix who have not experienced cervical ripening phase before labor present the greatest challenge with regard to labor induction. The duration of labor induction also is affected by parity and, to minor degree, by baseline uterine activity and sensitivity to oxytocic drugs(6).

1.2. Statement of the Problem

Induction of labor is an increasingly done obstetric procedure that has been strongly associated with poor maternal and perinatal outcomes (7).

Complications and failures of induction of labor may occur with improper patient selection, inadequate preparation, as well as the absence of fetomaternal monitoring to ensure a favorable obstetric outcome of a healthy mother and baby which are the targets of the safe motherhood initiative as well as the 4th and 5th millennium development goals (8).

Induction of labour should be performed only when there is a clear medical indication for it and the expected benefits outweigh its potential harms but in practice this is not the case in that elective induction of labor, without any medical indication, is increasingly being done (7).

Induction of labor is also is associated with negative maternal and perinatal outcomes as it may result in poorer maternal and perinatal outcomes than spontaneous labor (9).

In Ethiopia, including the study area, 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. The latest EDHS report that was done in the year 2011 didn't include information on induction of labor (10).

Despite the proven benefit of induction of labour in selected cases, one must 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 (11).

The consequence of a failed induction that usually result in a C-section compared to vaginal birth is more potential health risks to the woman and the baby, as well as, a significantly longer recovery period for the woman(12).

In appropriately practiced induction of labor may there for directly or indirectly be related to increased maternal and neonatal morbidity, which is the major health concern in the country.

Though the procedure is being practiced widely in the study area, determination of the magnitude of failed induction of labor and assessment of associated factors had not been undertaken.

Chapter 2: Literature review

2.1. Prevalence of induction of labor

According to the WHO, the rate of induction of labour is 25% in developed countries, however, in some settings of developing countries induction of labor is as high as those observed in developed countries (5). The study done in a health resource poor setting showed induction of labor giving an induction rate of 11.5 % (8). It is lower in African region as shown by the recent WHO Global Survey dealing with determinants of use of induction of labor in Africa showing an average rate of induction ranging from 1.4% to 6.8%(13). The study done in Aga Khan secondary Hospital showed that 18% of pregnant population who underwent induction of labour failed to deliver vaginally (12).

A study done in United States, Rowan University of Medicine and Dentistry showed that labor induction failed in 100 patients (28%) (13).

The study done in Pretoria South Africa the success rate of vaginal delivery within 24 hrs of initiating induction was found to be at 52.4 % with caesarean sections being done in 42.1%(14). The study done in University of North Texas Health Science Center showed that failed induction was (18.0%) (15).

There is no consensus on what constitutes failed induction though studies consider failure to achieve vaginal delivery as failed induction of labour.

2.2. Factors related with the outcome of induction of labor

Ramayahji et al at Kathmandu medical college training hospital in Nepal studied indications and predictors of a failed induction. They found nulliparous women (41.2%) to be more likely to have a failed induction than multiparous women (23.7%). However no reasons were given as to why nulliparous are more likely to have a failed induction. In addition, birth weights in the region 2.5kg to 2.9kg had a success rate of 77.5% while higher and lower birth weights have low success rates. It also showed that the failure rate of induction of labor was associated with maternal age, it also showed the known risk factors for failed IOL were nulliparity, diabetes and hypertension. Duration of induction is also a risk factor for caesarean delivery in induction of labor (11).

Khan et al looked at factors associated with a failed induction at a secondary hospital in Karachi Pakistan at the Aga Khan Hospital for women. Of the 719 women enrolled in their study, they found that parity, Bishop's score and gestational age had an association with failed induction of labor. The study also showed that Macrosomia, gestation age, bad obstetric history and pre labour rupture of membranes were other significant risk factors for emergency caesarean sections in induction of labor (12).

A study done in United States, Rowan University of Medicine and Dentistry of New Jersey (UMDNJ)-School of Osteopathic Medicine showed that Bishop Score is an excellent predictor of first stage labor time, as well as failure rates. A Bishop Score of 7 or greater should be considered for elective inductions of labor. Second stage labor times did not correlate with Bishop Score. Adequate cervical examination prior to medical management will aid practitioners and patients in making informed decisions regarding labor induction. In the same study the result showed that the most cited reasons for failed labor induction were failure to dilate, non-reassuring fetal status, failure to descend, Malpresentations, abruption, and worsening maternal medical status. Bishop score was inversely correlated with induction failure showing a predicable decline in success with lower scores. The highest failure rate was correlated with Bishop scores of the women (13).

Mbele et al carried out research in Pretoria South African at Kalofong Hospital to predict outcomes of oral misoprostol used for IOL in 558 patients. Factors they found that influenced the outcome of vaginal delivery within 24 hrs were parity, hypertension, and rupture of membrane, oligohydramnious with intact membranes, Cardiotocography findings and a Bishop's score (14).

The retrospective study done in North Texas Health Science Center showed that ethnicity, gestational age, BMI, parity status, and delivery time are shown to be statistically significant in representing an association with C-section. Mothers who are 40 years of age and older have five time the odds to have a C-section compared to mothers who are less than 18 years of age. Women with a BMI of 30 to 39, have a two to three times the odds for risk of cesarean delivery compared with a woman with BMI less than 25. Similarly, women with a BMI greater than 39 have nearly five times the odds of

cesarean delivery compared with women with BMI less than 25. Women with no previous children have the greatest risk of having a cesarean delivery compared to women with multiple children (15).

The relative risk of delivery versus continuation of pregnancy is influenced by factors such as gestational age, presence/absence of fetal lung maturity, severity of the clinical condition, and cervical status. Although timely induction of women with some pregnancy complications has been recommended to improve maternal-fetal outcome (16,17).

When induction of labour is carried out after 37 weeks' gestation in the presence of medical indications such as gestational hypertension, it reduces the risk of adverse maternal outcomes(18).

2.3. Outcomes related to types or methods of induction

Ellen L et al on their Methods of induction of labour: a systematic review showed that more subjects allocated to mechanical methods failed to deliver vaginally within 24 hours than those assigned to vaginal PGE2. The review also showed that Prostaglandin E2 (PGE2) and vaginal misoprostol were more effective than oxytocin in bringing about vaginal delivery within 24 hours but were associated with more uterine hyperstimulation. Mechanical methods reduced uterine hyperstimulation compared with PGE2 and misoprostol, but increased maternal and neonatal infectious morbidity compared with other methods. Membrane sweeping reduced post-term gestations.
(19).

On the study done in Ankara teaching hospital of Turkey, induction was successful in 918 cases (89.1%) and Foley catheter was placed in 112 (10.8%) women. Foley catheter achieved vaginal delivery in 83% of these women without causing an increase in the adverse neonatal outcome. The study also showed that Foley catheter can be the first treatment of choice in post-term nulliparous women or preterm women with Bishop Score ≤ 1. (20).

2.1. Conceptual frame work
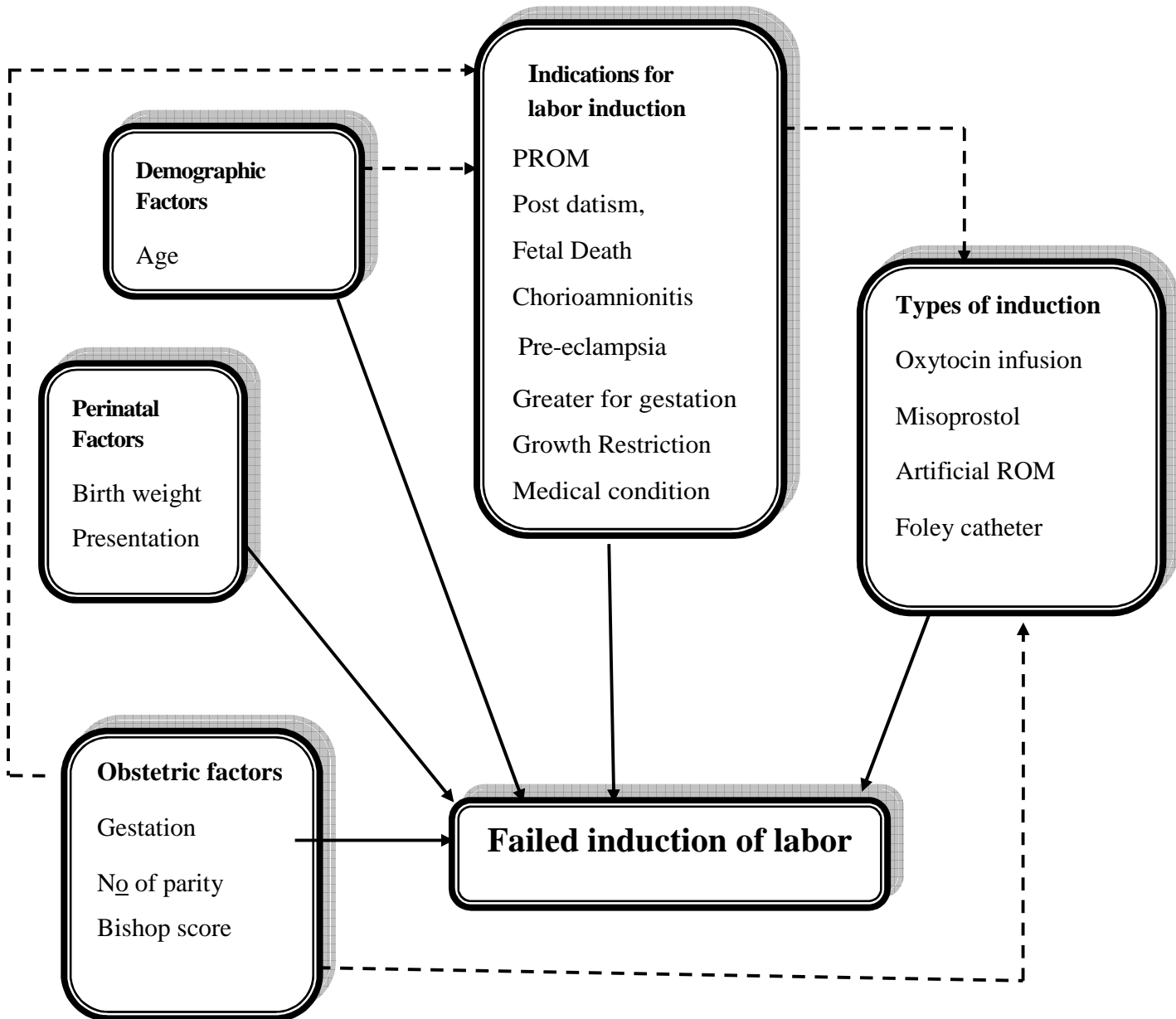
Figure 1 conceptual frame work

Developed after reviewing relevant literatures (1), (21), (16), (7),(22).

2.2. Significance of the study

Induction of labor is commonly practiced obstetric procedure in the study area; however studies have not been done on the magnitude and factors associated with its failure. This study is designed to improve the understanding regarding why there is failure of induction of labor among those women whose labor is induced. The finding of this study can also be used to inform professionals and patients about the possible increased risk of C-section and other complications that follow this procedure. It also provides valuable baseline data for stake holders and policy makers to intervene the appropriate management of the mother during induction of labor. The study will enable the institutions and the health care providers to have data when counseling women for induction. It will also help in informing evidence-based protocols on induction of labour in a local setting. The research will also give information for health care planners and researchers for further investigation.

Chapter 3: Objectives of the study

3.1. General objective

To determine the prevalence of failed induction of labor and identify associated factors in Hawassa public health facilities, SNNPR, Ethiopia from Jan 1st to Dec 31st 2014.

3.2. Specific objectives

❖ To determine the prevalence of failed induction of labor in the study area
❖ To identify factors associated with failed induction of labor in the study area.

Chapter 4: Methods and materials

4.1. Study area and period

This study was conducted at the public health facilities of Hawassa town, SNNPR, Ethiopia. Hawassa, one of the towns in Ethiopia, found on the shores of Lake Hawassa that lie on the Great Rift Valley. It is located 275 km south of Addis Ababa via Debrezeit, 140 km east of Wolaita Sodo, and 80 km north of Dilla. The town serves as the capital of the Southern Nations, Nationalities, and Peoples Region. It covers 50 square kilometers with a total population of 328,283 that live in 8 Kifle-ketema which consist 32 kebeles. There are one referral hospital, one district hospital and nine health centers in the City administration. The study was conducted from Mar 15th to April 15th, 2015.

4.2. Study design

A facility based cross sectional study design was employed.

4.3. Population

4.3.1. Source population

All medical records of women admitted for induction of labor from Jan 1st to Dec 31st 2014 in Hawassa public health facilities.

4.3.2. Study population

Selected medical records of women with induction of labor from Jan 1st to Dec 31st 2014

4.4. Eligibility criteria

4.4.1. Inclusion criteria
- Women who gave birth after induction of labor from Jan 1st to Dec 31st 2014
- Induction performed at gestational age (GA) of 28wks or more

4.4.2. Exclusion criteria
- Records with incomplete information

4.5. Sample size determination and Sampling technique

4.5.1. Sample size determination

Sample size was determined by using single population proportion formula by taking the prevalence of induction 50% and the desired accuracy of 0.05 at 95% confidence interval (z-statistics=1.96), where

N = stands for the desired sample size

Z = the standard normal deviation (1.96)

P = the proportion of the target population estimated to have particular characteristics (0.5)

q = 1-p

d=degree of accuracy desired (marginal error), then the sample size has been calculated as:

$$n = \frac{(Z\frac{\alpha}{2})^2 \, P \, (1 - p)}{d^2}$$

$$n = \frac{(1.96)^2 \, 0.5 \, (1 - 0.5)}{0.05^2}$$

$$= 384$$

Since number of induction performed on the specified period i.e. source population (N) was **1260** (<10,000) correction formula was used as follows:

$$nf = \frac{n}{1 + n/N}$$

$$nf = \frac{384}{1 + 384/1260}$$

$$= 294$$

So, the final sample size was **294**

4.5.2. Sampling technique

There were three public health facilities in the study area in which IOL was being performed. According to the data obtained from these health facilities the total number of mothers delivered after induction of labor in the last one year was 1260. The sample size (294) was allocated for each health facility proportionally. Systematic random sampling technique was used to select the samples from the list of women with induction of labor from Jan 1st to Dec 31st 2014 with the value of k being 4 and fulfilling the criteria after making frame with the list of card numbers of mothers for whom induction of labor was performed. For missed or incomplete kth record, the immediate following record was taken.

```
                    ┌─────────────────────────────────┐
                    │  Total induction of labor (1260) │
                    └─────────────────────────────────┘
         ┌────────────────┐  ┌──────────────┐  ┌──────────────┐
         │ Referral hospital│  │ Adare hospital│  │  Bushulo H/C  │
         │      (540)       │  │    (420)      │  │    (300)      │
         └────────────────┘  └──────────────┘  └──────────────┘
    ┌─────────────────────────────────────────────────────────┐
    │ Proportional allocation of the sample to each facility   │
    └─────────────────────────────────────────────────────────┘
         ┌──────┐          ┌──────┐          ┌──────┐
         │ 126  │          │  98  │          │  70  │
         └──────┘          └──────┘          └──────┘
         ┌─────────────────────────────────────────┐
         │  Systematic random sampling technique    │
         └─────────────────────────────────────────┘
                        ┌─────────┐
                        │   294   │
                        └─────────┘
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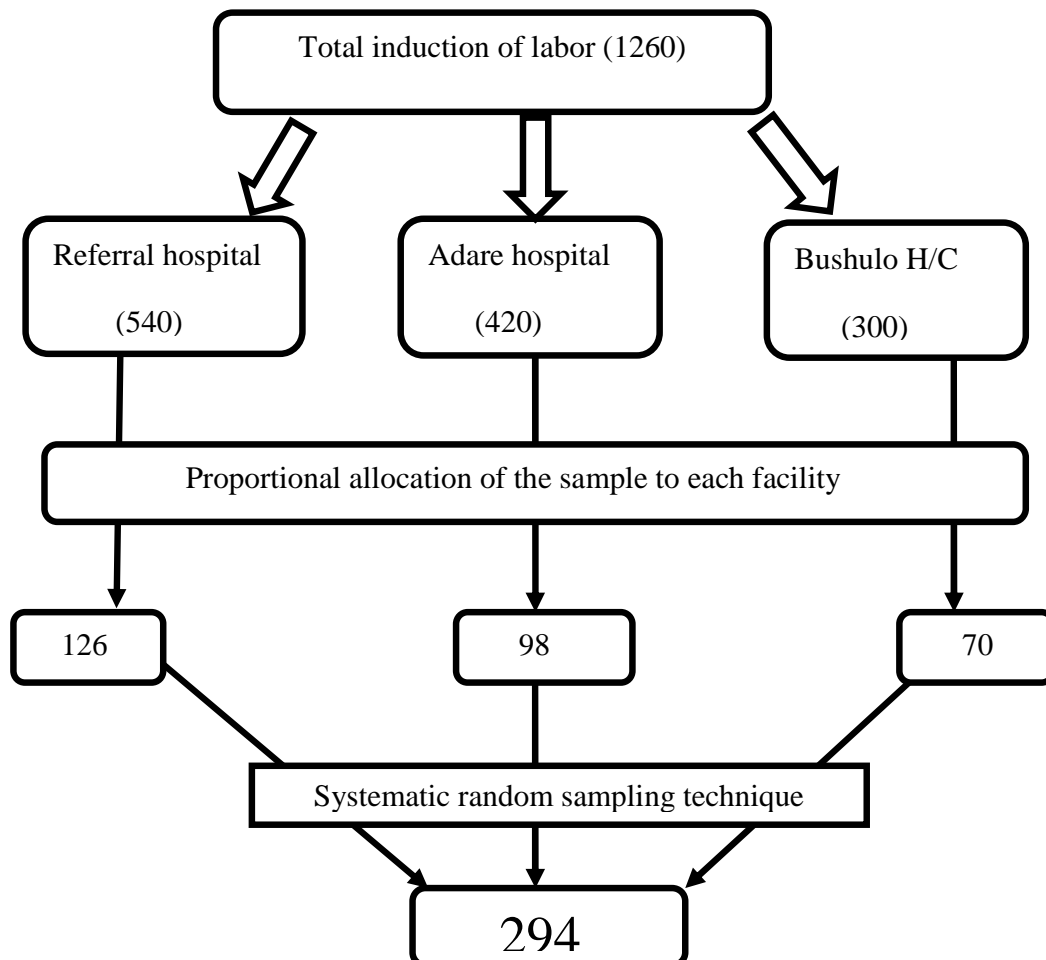
Figure 2 Schematic presentation of sampling procedure

4.6. Study variables

4.6.1. Dependent variable
➢ Failed Induction of labor

4.6.2. Independent variable
- **Demographic Factors**

  Age

- **Types of induction**

  Oxytocin infusion, Misoprostol, Artificial ROM, Folly catheter

- **Obstetric factors**

  Gestation, No of parity, Bishop score

- **Indications for labor induction**

  PROM, Post datism, Fetal Death, Pre-eclampsia, chorioamnionitis, greater for
  gestation, Growth Restriction, Medical complications

6.7. Operational definitions and definition of terms

Failed induction: - is defined as inability to enter into the active phase of labour despite induction of uterine contraction for a total of 12 hours.

Indication for induction of labor: – Are medical factors that necessitate termination of pregnancy by induction of labor.

Modified Bishop scoring: - a tabulated clinical score used to determine how successful an induction of labour will be consisting five characteristics of the cervix: dilatation, length, consistency, station and position. A Bishop's score of 5 and above is said to be favorable for induction of labour.

Elective induction of labor: an induction done with no medical or other indications (23).

Greater for gestational age: when the estimated weight for age of the fetus is above the 90th percentile.

4.8. Data collection instrument

Data collection instrument was adapted after reviewing relevant literatures (7,11,12,16,22,24) and the data was collected from medical records of women for whom induction of labor was performed in Hawassa public health facilities using pre tested structured checklist. Items were developed for this study to assess socio demography factors, obstetric factors, types of induction performed and health indication for labor induction. Checklist consist five sections that have a total of 22 items which describe the purpose of the study. The socio- demographic part contains 1 item which gives information about the age of the mother. The fetal factors were assessed by using 4 major items that consists Gestational Age, Presentation, Birth Weight and Apgar score at 1[st] and 5[th] minute. Maternal, Perinatal and antenatal care factors were addressed by using 17 items.

4.9. Data collectors

To collect the data, a total of six diploma Nurses (5 clinical, 1 Midwife) were hired. Training was given for one day on relevance of the study and techniques of reviewing medical records. One supervisor who had Bachelor of Science in Nursing with the principal investigator had supervised the data collection procedures. All record reviews were checked for completeness each night. Morning session was conducted every day with supervisor and data collectors.

4.10. Data quality control

To ensure the quality of data, training for data collectors and supervisor was given and checklist was pretested with five percent of study population on medical records of women admitted for induction of labor at Leku hospital before the actual data collection to assess its clarity, length, completeness and consistency; and necessary corrections were made. Supervisor and the principal investigator had closely followed the data collection process. The record review was checked daily for completeness and to correct errors.

4.11. Data Analysis

Each completed checklist was edited by principal investigator to minimize errors. Then data was entered in to Epidata version 3.1 to control data entry errors and exported to SPSS version 21 for analysis. Percentage, frequency and mean were calculated. Bivariate analysis was performed between dependent variable and each of the independent variables, one at a time. Their Odds ratio (OR), at 95% CI and p-value was obtained. All variables found to be significant at bivariate level (at p-value <0.25%) has been entered in to multivariable logistic regression analysis to test the significance of their association.

4.12. Ethical Consideration

Ethical clearance letter was obtained from ethical review board of Jimma University College of health sciences. Official permission letter was also obtained from Hawassa city health department and all the respective study health facilities. Confidentiality and anonymity of the record had been ensured throughout the execution of the study by taking only the required information without using the name of the client.

4.12. Dissemination of study results

The finding of this study will be presented to Jimma university department of Nursing and Midwifery. The paper will also be presented on seminars and conferences. The study finding will be sent to Hawassa city health department and each health facilities where the study was conducted. A great endeavor will be made to publish in reputable peer reviewed national and international journals.

CHAPTER FIVE: RESULT

1. Socio-demographic factors

A total of 294 medical records of mothers who gave birth after induction of labor were selected for study purpose. The mean age with its standard deviation of the selected women was 26.29±4.133 and 242 of all samples were bellow 30 years of age.
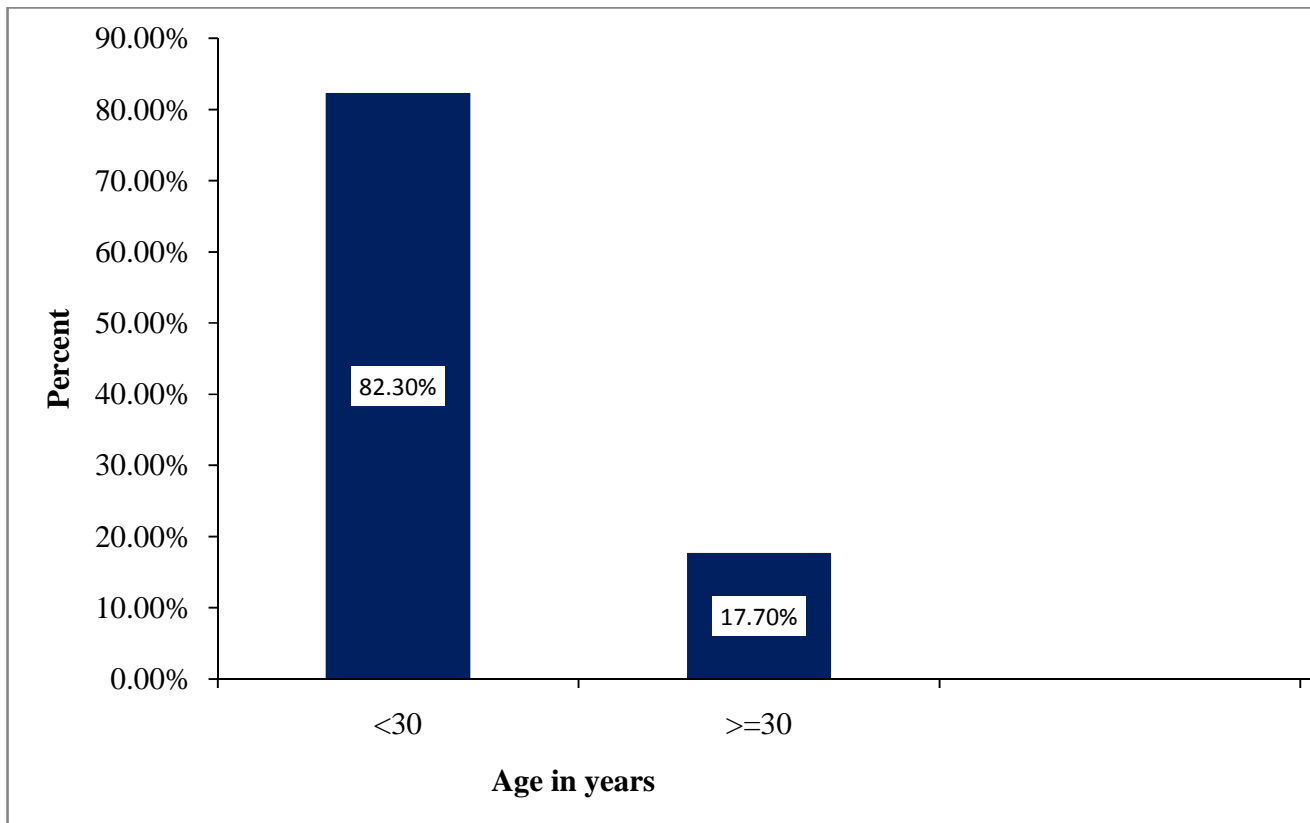
Figure 3   The age category among mothers for whom induction of labor has been done in Hawassa public health facilities, SNNPR, Ethiopia, 2014

2. Obstetric factors

The mean gestational age with its standard deviation was 38.95 and 2.57, respectively. The result showed that 55.8% of the women in the study were primigravidas. The Bishop score of 185(62.9%) study participants was less than five before induction of labor.
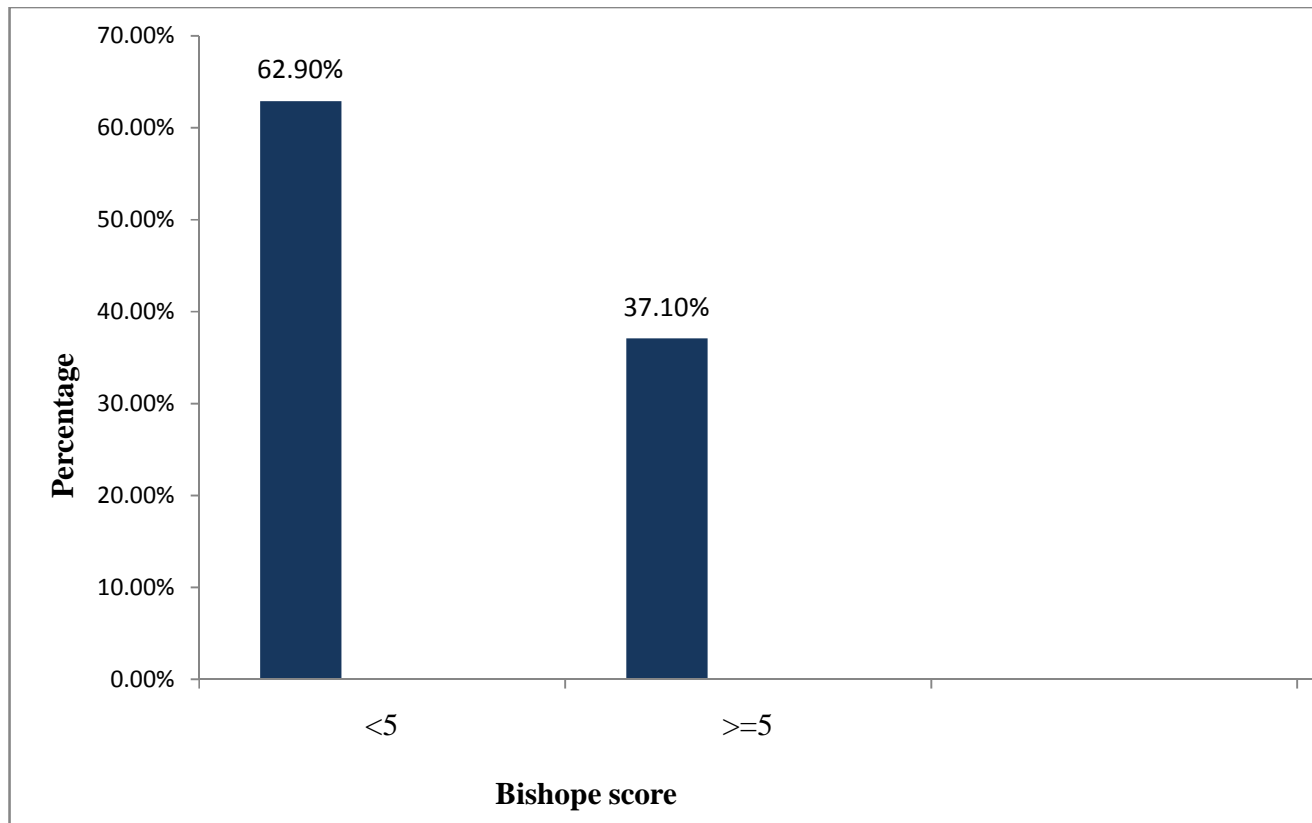
Figure 4 Pre-induction Bishop Score of the mothers for whom induction of labor has been done in Hawassa public health facilities, SNNPR, Ethiopia, 2014

3. Indications for labor induction

The result showed that the predominant indications for induction of labor in the study area were premature rapture of membrane, Preeclampsia, Post term and Chorioamnionitis.

Table 1 Indications for induction of labor among women delivered in Hawassa Public health facilities, SNNPR, Ethiopia, 2014

Indications	N	%
Premature rapture of membrane	88	29.9
Preeclampsia	83	28.2
Greater for gestation	61	20.9
Post term	49	16.7
Chorioamnionitis	43	14.6
Growth restriction	35	11.9
Vaginal bleeding	30	10.2
Medical complications	27	9.2
Obstetric complications	17	5.8
Fetal death	10	3.4

NB: the percentages didn't add up to 100 as there were multiple responses.

4. Methods of induction

The most commonly used methods of induction of labor in the study were oxytocin infusion (73.5%) and oral or vaginal misoprostol (26.5%).

5. Maternal prenatal and Antenatal factors

There was a previous history of abortion in 9.5% of the study participants, while there were other bad obstetric experiences in 5.4% of them. The length of time for induction of labor varied from 2 to 23 hours with its mean and standard deviation to be 8.89 and 4.08 respectively. The tone of pregnancy in all mothers was singleton. Out of the total samples, 181(61.6%) mothers ended with vaginal delivery while others delivered by cesarean section. (Fig. 5)
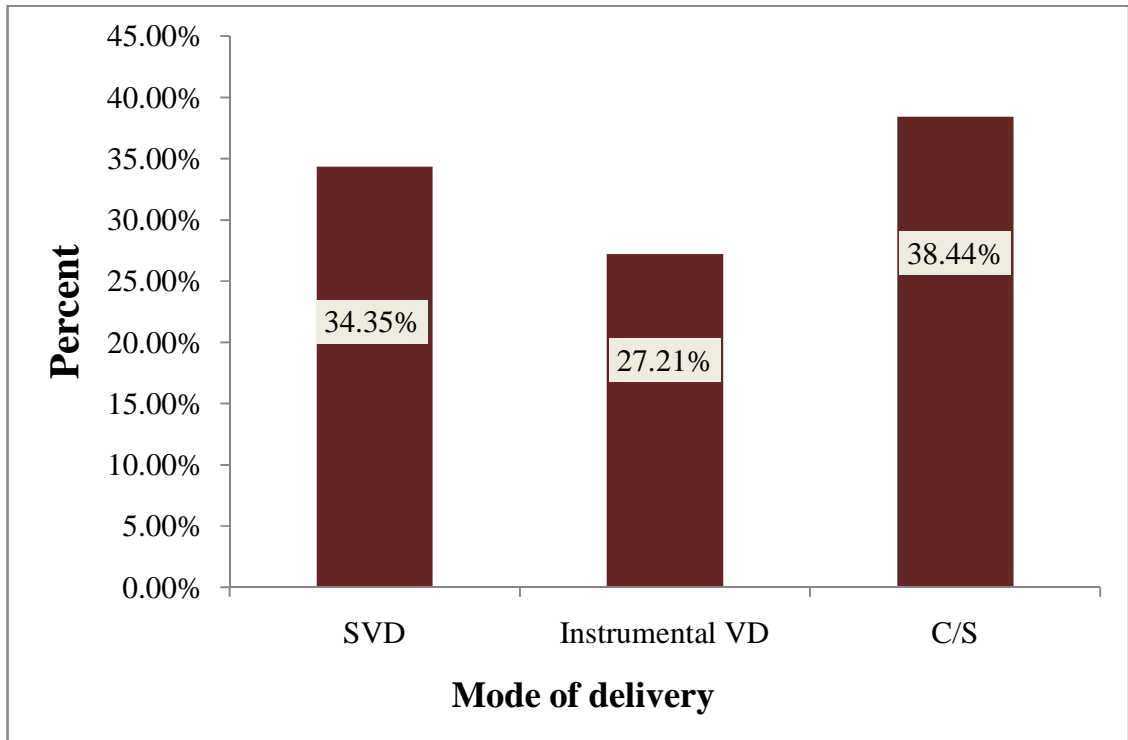
Figure 5 Mode of delivery among women delivered after induction of labor in Hawassa Public health facilities, SNNPR, Ethiopia, 2014

The Apgar scores of the newborns at first minute in 70.1% of the cases were greater than seven, but at fifth minute the score became greater than seven for 83.3% of newborns. Reasons for cesarean section among women were: cephalopelvic disproportion, fetal distress and failure of induction. (Fig. 6)
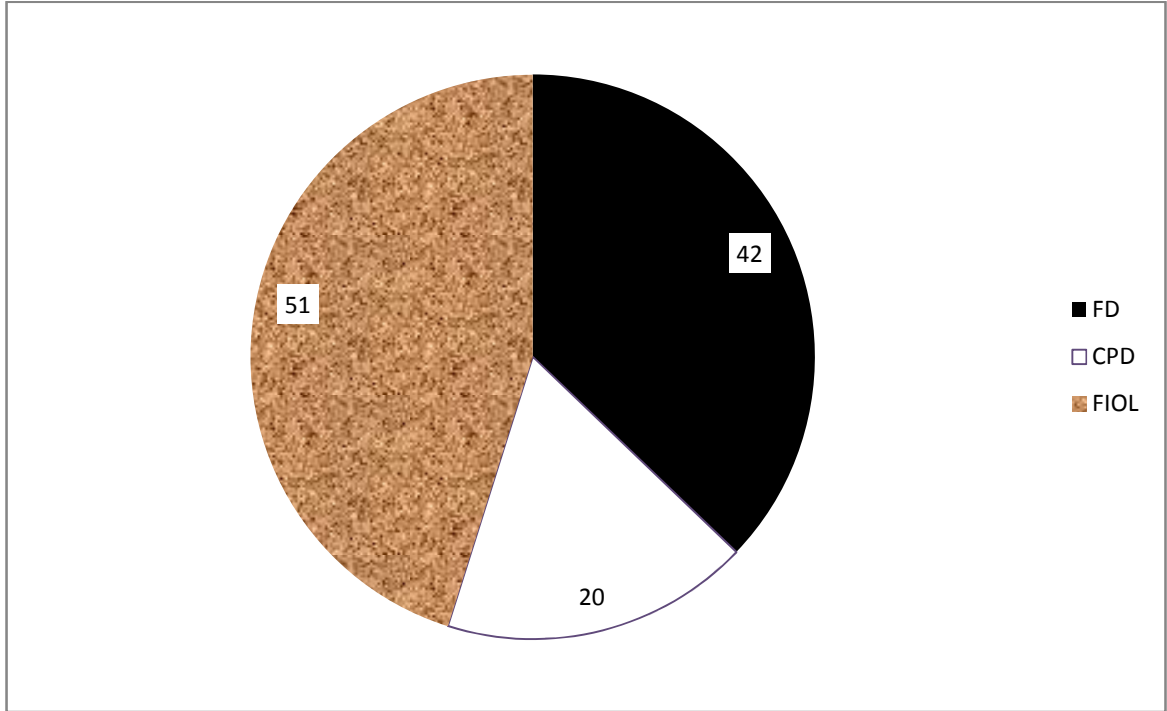
Figure 6 Frequency of reasons for cesarean section among women delivered after induction of labor in Hawassa Public health facilities, SNNPR, Ethiopia, 2014

The total number of Neonatal Intensive Care Unit (NICU) admission in the newborns was 41 (13.9%). All mothers were alive at their discharge.

6. Factors associated with failed induction of labor

Different variables that were assumed to be associated with failed induction of labor were assessed first by using bivariate then multivariable logistic regression analysis methods. There were ten variables that showed significant association with the outcome variable when entered into bivariate logistic regression model. These were: parity, age of the mother, pre-induction bishop score, premature rapture of membrane, greater for gestation, preterm rapture of membrane, post term, bad obstetric history, fetal gestation and length of induction.

However; multivariable logistic regression analysis showed that Primiparity [AOR= 3.121 (1.01-9.62)], age greater than 30 years [AOR = 8.85 (2.60-30.05)], pre-induction bishop score of less than five [AOR= 4.429 (1.52-12.84)], premature rapture of membrane [AOR = 7.120 (2.83-17.89)], greater for gestation [AOR = 7.212 (2.45-21.19)], post term pregnancy [AOR = 4.344 (1.17-16.11)] and bad obstetric history [AOR = 5.641 (1.38,23.02)] had association with induction failure. (Table 2)

Table 2   Bivariate and multivariable logistic regression model among women delivered after induction of labor in Hawassa public health facilities, 2014.

Variables		Failed induction of labor		COR(95.0%CI)	AOR(95.0%CI)
		Yes(N=51)	No(N=243)		
Age in years	≤30	33	209	1	
	>30	18	34	3.35(1.70,6.61) **	8.85 (2.60-30.05) **
Parity	Multi	15	115	1	
	Primi	36	128	2.156(1.12,4.14)*	3.12(1.01,9.62) *
pre-induction bishop score	>5	7	102	1	
	≤5	44	142	4.54(1.96,10.50) **	4.42(1.52-12.84) *
Chronic disease	No	47	219	1	
	Yes	4	24	0.77(0.25,2.34)	
Preterm rapture of membrane	No	42	231	1	
	Yes	9	12	4.12(1.636,10.39)*	2.87(0.81-10.08)
premature rapture of membrane	No	14	192	1	
	Yes	37	51	9.95(5.00,19.80) **	7.12(2.83-17.89) **
greater for gestation	No	26	207	1	
	Yes	25	36	5.52(2.87,10.62)**	7.21(2.45-21.19) **
Fetal birth weight	≤2.5kg	5	43	1	
	>2.5kg	46	200	1.978(0.742,5.27)	
post term	No	34	211	1	
	Yes	17	32	3.29(1.65,6.57) *	4.34(1.17-16.11) *
bad obstetric history	No	43	235	1	
	Yes	8	8	5.46(1.94,15.34) *	5.64(1.38,23.02) *
preeclampsia	No	39	172	1	
	Yes	12	71	0.74(0.36,1.50)	
Length of induction	<12hr	36	203	1	
	>12hr	15	40	2.11(1.05,4.22) *	0.62(0.24-1.59)
Fetal gestation	37-41w	25	169	1	
	Others	26	74	2.37(1.28,4.38)*	0.38(0.12-1.24)

*(For AOR) * = statistically significant at p<0.05   ** = statistically significant at p<0.001   1=reference   others= <37and>41 weeks of gestation*

CHAPTER SIX: DISCUSSION

This study showed that the prevalence of failed induction of labor was 17.3%, this rate is greater than that of the study done in health resource poor settings (8).

The higher failure rate in the present study may be due to the higher proportion of primiparous women included in the study as there would be less likely ripen cervix. It may also be due to variation in commonly used methods of induction of labor, in which oxytocin infusion was the predominantly used method in the study area while in the other cases misoprostol with other safe methods like Balloon catheter was used as a common practice.

The common indications for induction of labor in the study area were premature rapture of membrane followed by Preeclampsia and greater for gestation, but post term, the first indication for induction of labor in the study done at Kathmandu Medical College Teaching Hospital (11), was the fourth indication in the present study.

The discrepancy may be related with inaccurate determination of gestational age to ascertain post term that may sometimes be an obstetric dilemma due to unsure date of the last menstrual period and non availability of early dating ultrasound scan as often the case in resource constrained settings. It might also be due to the practice of early induction at 40+ weeks by the obstetricians in the other area which might be because of lack of facilities for intensive care.

The finding of this study also showed that the odds of failed induction was 3.12 times more in primiparous mothers. This might be for the reason that multiparous women have a 'tested' pelvis when it comes to vaginal deliveries decreasing the chance of failure of the procedure. This shows that probably contracted pelvis could have the higher incidence of failed induction in the case of nulliparous women.

This finding is supported by the study done by Ramayahji RT et al in the teaching Hospital(11) and the finding of N. Khan et al at Aga Khan University Hospital but the rate is higher, (12). The higher result in the case of the present study might be due to absence of important practices like use of cervical primers (a method to make the cervix softer and shorter) prior to induction.

In this study, mothers with age greater than 30 years were more at risk (34.6%) of having failed induction of labor than others (13.6%) , which is supported by the study done in Kathmandu Medical College Teaching Hospital(11).

The odds of failed induction was 4.42 times more in women with Bishop Score of 5 or less. The study done by Maria Olender et al also showed that Bishop score was inversely correlated with induction failure showing a predicable decline in success with lower scores (13). This may be due to the need of prolonged induction of labour than the recommended period in order to ripening the cervix. The finding supports scientific findings of different literatures that 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 (8,16).

The odds of failed induction was 7.21 times more in women with greater for gestation than others. This finding is in line with the study done in Aga Khan University Hospital(12). This may be due to infants with greater for gestation usually have birth weights greater than 4000g which in turn increase the probability of failure of induction due to increased chance of macrosomia(11).

This study also showed that the odds of failed induction was 5.64 times more in mothers with bad obstetric history than others. This is supported by the study finding of Neelofur Babar Khan et al at University Hospital (13). This may be for the reason that women with bad obstetric history most of the times are not allowed to go beyond 40 weeks and therefore will have unfavorable cervix at time of induction(12).

The mostly used method of induction in the study area was oxytocin infusion (72.8%), this is in contrary with the study done in regional hospital of KwaZulu-Natal, South Africa where the most commonly used methods of IOL were oral misoprostol (63.5%) and vaginal misoprostol (30.3%)(27) and the finding of the study done in health resource poor setting in which use of misoprostol took the higher score, 78.2% (8). The reason for use of oxytocin as the most common method of induction of labor in the study area may be its availability in the study settings or it may be due to the induction protocol of the study facilities.

The study also showed that relatively safe methods of induction of labor such as Foley catheter (20) were not used at the study settings. This may be due to the study facilities probably reinforcing the use of oxytocin infusion and misoprostol as usual modes for induction of labor.

During the study it was found that there was not properly guiding safety tool such as checklists in the study health facilities to ensure safe way of induction of labor as a result information were not properly documented.

STUDY LIMITATIONS

- Variables like Bishop Score are subjective with inter and intra observer variations that potentially contribute to bias.
- There might be other variables that were not accounted but could have effect on the results of the study
- To the best of the investigator knowledge there was a scarcity of literature on this topic

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS

7.1. Conclusion

The prevalence of failed induction of labor was high in the study area. Variables which increased the likelihood of failed induction were advanced maternal age, unfavorable bishop score, post term, premature rapture of membrane, greater for gestation and bad obstetric history.

7.2. Recommendation

Based on the finding of this study, the following recommendations are made:

- ➢ Induction of labour in women with advanced age, greater for gestation, post term and unfavorable cervix should be approached with caution by the practitioners.
- ➢ The study health facilities should practice use of Foley catheter and mechanical dilators such as Laminaria tents in their protocol for their safety and effectiveness as alternative methods to the use of prostaglandins.
- ➢ Further multicentre, prospective studies should be done by researchers to have a better understanding on factors leading to failure of induction of labour.

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Annex I: checklist

Card No ------------------------- **Name of facility** - - - - - - - - - - Date___/___/__

Instruction: Please circle or fill the correct information of the Woman.

Part I: Maternal Personal Data

No.	Questions	Choice/Response
101	What is Woman's Age in years	____ years

Part -II Questions on Maternal factors

No.	Questions	Choice/Response
201	What is Woman's Number of parity (having given birth)	1. Primipara 2. Multipara
202	What was Bishop score	1. ≤ 5 2. >5
203	Any known chronic illness during pregnancy	1. yes 0. No
204	Preterm rupture of membrane	1. yes 0. No

Part - III Questions on fetal factors

S. No	Item	Choice/Response
301.	Fetal gestational age in weeks	-------- wks
302.	Fetal presentation	1. Normal 0. Abnormal
303.	New born birth weight in gm	0. ≤ 2500 1. >2500
304	Apgar Score at 1st minute	1. <5 2. ≥ 5

Part IV- Questions on Perinatal Factors

No.	Questions	Choice/Response	
401	**Indication for induction**	**Yes**	**No**
401.1	Fetal Death	1	0
401.2	Growth Restriction	1	0
401.3	Fetal Distress	1	0
401.4	Multiple Pregnancies	1	0
401.5	PROM	1	0
401.6	Greater for gestation	1	0
401.7	Chorioamnionitis	1	0
401.8	Vaginal Bleeding	1	0
401.9	Pre eclampsia	1	0
401.10	Post term	1	0
401.11	Elective Induction	1	0
401.12	Maternal Request	1	0
401.13	Other Obstetric Complications	1	0
401.14	Other Medical Complications	1	0
405	**Type of induction performed**	**Yes**	**No**
405.1	Oxytocin infusion	1	0
405.2	Misoprostol	1	0
405.3	Other prostaglandins	1	0
405.4	Artificial ROM	1	0
405.6	Mixed	1	0
406	Mode of delivery	1. spontaneous Vaginal delivery 2. Instrumental delivery 3. Caesarean section	
407	If C/S is performed after induction, what was the reason?	1. Failed induction 2. Fetal distress 3. CPD 4. others	

Part V- Questions On Maternal prenatal and Antenatal Care Service factors

S. No	Item	Choice/Response
501	Is there any abortion history previously	1. Yes 0. No
502	Is there any Bad Obstetric history different from abortion?	1. Yes 0. No
503	Length of time on induction(in Hr)	----------- Hrs
504	Tone of pregnancy	1. Singleton 2. twins
505	Any anaesthesia used during induction of labor?	1. Yes 0. No
506	If yes for Q506, what type of anaesthesia during labour was used?	1. Epidural 2. Spinal 3. Parenteral analgesic 4. Alternative methods
507	Fetal Apgar score at 5th minute	1. <7 2. ≥7
508	Admission to neonatal intensive care unit	1. Yes 0. No
509	Maternal Status at discharge	1. Alive 2. Dead 3. Referred to the higher clinic

Assurance of principal investigator

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the Faculty of Public Health in effect at the time of grant is forwarded as the result of this application. I can also assure that this thesis is my own work.

Name of the student: Mathewos Geta (BSc N)

Date._____   Signature _____

Name of the first advisor: Prof. Tefera Belachew (MD, MSc, PhD)

Date._____   Signature _____

Name of the second advisor: Mr. Bekana Fekecha (BSc, MSc)

Date._____   Signature _____