INSTITUTE OF MEDICINE AND HEALTH SCIENCE

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PREVALENCE AND FACTOR ASSOCIATED WITH SUCCESSFUL INDUCTION OF LABOR AMONG MOTHERS DELIVERED IN DEBRE BERHAN COMPREHENSIVE SPECIALIZED HOSPITAL, 2020 G.C

A RETROSPECTIVE CROSS SECTIONAL STUDY

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LIST OF ACRONYMS

ANC	Anti Natal Care
APGAR	Appearance, Pulse, Grace, Activity, Reflex
CS	Caesarean Section
DBCSH	Debre Berhan Comprehensive Specialized Hospital
IOL	Induction of Labor
IUFD	Intra Uterine Fetal Death
IUGR	Intra Uterine Growth Restriction
PIH	Pregnancy Induced Hypertension
PROM	Premature Rupture of Membranes
SPSS	Statistical Package for Social Science
WHO	World Health Organization

ABSTRACT

Background; *Induction of labor is a process of artificial initiation of uterine contractions after the age of fetal viability and before spontaneous onset of labor, with the aim of achieving cervical effacement and dilatation leading to vaginal delivery. But it is not always successful to achieve vaginal delivery due to several factors.*

Objective; *the aim of this study was to assess prevalence and factor associated with success of labor induction among mothers delivered in Debre Berhan comprehensive specialized hospital*

Methods; *Institution based retrospective cross-sectional study was employed among 405 documents of women who undergone induction of labor from January 2018 to December 2019 in Debre Berhan comprehensive specialized hospital by using structured checklists. Five BSc midwives collected the data. Data was entered and coded by using Epi data version 3.1, and analyses were done by SPSS version 22. Descriptive statistics was used to describe the study variables. An odds ratio (95% confidence intervals) binary and multiple logistic analyses were used to determine the association of different factors with success of induction of labor. P < 0.05 was considered statistically significant in multivariate regression analysis.*

Result; *A total of 405 women's document reviewed, 267(65.9%), [95%CI: 61.7-70.4] of women who undergone induction of labor had successful induction. The most common indication for induction was premature rupture of membrane (48.1%). the study also found that multigravida women's and diastolic blood pressure less than 90 mmhg were 2.4 times more likely to have successful induction with AOR of 2.47 (95%CI:1.35-3.05) and 2.08 (95%CI:1.12-3.86) respectively.*

Conclusion; *Generally this study implies two out of three women's who undergone induction of labor had successful induction. Diastolic blood pressure and number of pregnancies were significant association to the success of induction.*

Recommendation; *the hospital should set clear bishop score systems on the induction chart. In addition it should have a follow-up and evaluation on the assessment and documentation of bishop score.*

Key words; *failed induction of labor, induction of labor, successful induction of labor.*

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. When this physiological process fails to occur naturally labor will be inducted, Induction of labor is a process of artificial initiation of uterine contractions after the age of fetal viability and before spontaneous onset of labor, with the aim of achieving cervical effacement and dilatation leading to vaginal delivery (1,2).

Induction of labor (IOL) is considered when there is a specific health concern on the mother and the fetus such as high blood pressure, diabetic mellitus, if the baby is overdue (more than 41 weeks), if there is concerns on (less movements, low fluid, not growing well) and/or waters have already broken but contractions have not started naturally (3).

Labor induction rate can vary from place to place depending on the availability of resources and population. Worldwide, the prevalence of labor induction varies greatly between countries and even between different regions of the same country. According to World Health Organization, in developed countries up to 25% of all deliveries at term can takes place through induction of labor, but generally lower in African countries and it accounts average 4.4% of deliveries (4).

In developing countries premature rapture of membrane is the most common reason for IOL and the method of induction varies from different countries. Study conducted in southwest part of Ethiopia; oxytocin infusion is the most commonly used methods for induction of labor and induction was successful in 65.7% of mothers (5).

This study was aimed at provide information on prevalence and identifying factors for successful induction of labor in Debre Berhan comprehensive specialized Hospital (DBCSH) which helps to improve quality of IOL and decrease unnecessary indication of the CS procedure to reduce the rate of maternal and infant mortality and morbidity resulting from pregnancy and delivery related complications.

1.2 Statement of the Problem

Globally, high number of mothers and neonates are dying related to pregnancy and delivery in the world, as per the 2016 estimate by UN agencies, 216 mothers per 100,000 live birth and 19 neonates die for each per 1000 live birth (6). The data is more severe in developing countries especially in sub-Saharan Africa. In Ethiopia there was death of 48 neonates per 1000 live birth and 412 maternal death per100, 000 live births from 2011 to 2016 (7).

Induction of labor has directly relevant to the reducing maternal and neonatal mortality as it has potentials for preventing maternal complications and improving pregnancy outcome (8). Labor induction represents an attempt to reduce the prevalence rate of caesarean sections. Caesarean sections delivery by itself is not 100% safe. It has associated with a 3 up to 6 fold risk of severe complications. Furthermore, it also increases maternal and neonatal morbidity and mortality (9).

High rates of induced labor generally have lower rates of caesarean section as compared to simple vaginal delivery. Caesarean sections delivery by itself has causes for long stay in the hospital, greater need for anti-pains, bigger chance of infection and complications and also it has been strongly associated with poor maternal and perinatal outcomes compared with spontaneous vaginal labor(10).

In high risk pregnancies induction of labor is beneficial and safe when the benefits of early delivery outweigh the risk of continuation, but this is not without attendant complications and failures which can be significantly reduced with proper patient selection, good preparation, as well as adequate fetal and maternal monitoring to ensure a favorable obstetric outcome of a healthy mother and baby (11).

In Ethiopia, induction of labor is practicing widely from district to specialized hospitals. However, it is increasingly practicing in preventing neonatal and maternal mortality and morbidity labor induction have potential of failed outcome. Research conducted in Jimma University Specialized Hospital 21.4% of the mothers experienced failed induction. Maternal age, Bishop Score, PROM and fetal conditions like; fetal heart rate abnormality, weight and APGAR score were factors that related with the outcome of induction of labor. This must all be taken into account to improve outcome of induction (12).

Despite the fact that induction of labor plays a vital role in the reduction of maternal and neonatal mortality, in many sub-Saharan countries there is no adequate study. So, this study aims to fill the gap in lack of sufficient evidence about the prevalence of successful induction of labor and their associated factors among mothers delivered in Debre Berhan comprehensive specialized hospital in 2018 to2019, by conducting an Institution based cross sectional study from February to march 2020.

1.3 Significance of the Study

Induction of labor is an important practice that is carried out commonly in modern day obstetrics even though it is not always successful. When it is not successful it leads to caesarian section. Caesarian section delivery by itself is associated with a higher rate of excessive blood loss, postpartum infection and maternal mortality. However, in the study area caesarian section delivery is increasing despite of this due to several factors majority of emergency CS were performed following induction of labor.

Therefore, this study assessed the prevalence and factors affecting successful induction of labor among mothers delivered in Debre Berhan comprehensive specialized hospital. This enables the institution and health care providers to have information when counseling women for induction. It will enable woman who needs induction of labor to get improved quality of care in the hospital. It also helps in informing evidence-based protocols on induction of labor in a local setting and other part of the country. It would also provide information for ministry of health and other stakeholder's works in obstetrics to develop uniform clinical guideline for induction of labor across the country. Hence, there is no sufficient studies conducted on this increasingly standard practice, the data would also help for researchers and academic institutions to do further studies on induction of labor in Ethiopia and abroad.

2. LITERATURE REVIEW

2.1 Prevalence of Induction of Labor

Labor induction rate can vary from place to place depending on the availability of resources and population. Study conducted in Saudi Arabia 16% of women's had Induction of labor (13). Similarly, a study conducted in Nepal and India showed prevalence of induction of labor was 7.2% and 13.6%, respectively (14,15). A retrospective cohort study in South Africa the Incidence of IOL was 14.6% (16). Another study conducted in Southwest Nigeria suggested that prevalence rate of induction was 12.7% (17). Similar study conducted in Kenyatta national hospital in Nairobi suggested that 52.5% of pregnant women at a gestational age of 41 weeks and above undergoing induction of labor (18).

In Ethiopia A Facility based, retrospective cross sectional study showed that 22.4% of laboring mothers were undergone inductions of labor (5). This suggests that even if induction of labor is practicing widely in the field of obstetrics, it has variation from facility to facility.

2.2 Success of Induction of Labor

A Study conducted in Saudi Arabia showed that among women who had IOL Vaginal delivery was achieved in 84% of mothers (13). study done in India among women who undergone induction of labor 80.6 % were delivered vaginally (19). Another study conducted in North Western Iran 87.9% of Induction had successful. (20).

A retrospective cohort study conducted in South Africa Induction of labor was successful in 50.7% of cases (16). According to study conducted in Southwest Nigeria, among mothers who had IOL 63.5% had vaginal deliveries (17). Another study conducted in Kenyatta national hospital in Nairobi 68% of induction of post-term pregnancies was successful and the CS rate was found to be 32% (18).

In Ethiopia A cross sectional study conducted in Wolliso St. Luke, Catholic Hospital, women's undergone IOL 57.89% had successful outcome (5). Another cross section study conducted in wolaita Sodo More than half 59.7% of the women delivered vaginally within 12 hours after induction, while 26.5% of mothers delivered by CS due to failed induction (21).Similar study conducted in Jimma University Specialized Hospital among mothers who

undergone induction of labor, Induction was successful in 65.7% of the study subjects (12). and study conducted in Hawassa 83.7% of mothers had successful induction of labor (22).

2.3 Factors for successes of Induction of Labor.

2.3.1 Socio demographic Factors

According to study conducted in Ferrara university of India maternal age was one independent significant variable on determining the risk of cesarean delivery after IOL (19). A study conducted in Iran, Saudi Arabia and Kenya showed non-significant relationship between maternal age and success of induction (21, 15, 18).

In Ethiopia a cross sectional study conducted in Wolaita Sodo, the odds of women with the age of less than 24 years were 2 times higher than those who were aged 25 and above to experience successful induction (21). Another study conducted in Jimma University Specialized Hospital maternal age were significantly associated with the successful outcome of induction of labor (12). Study conducted in Addis Ababa army referral and teaching hospital Showed that the odds of women with age of less than 24 years were 2 times were higher than those who were aged 25 and above to experience successful induction (23).

2.3.2 Obstetric Histories

Study conducted in King Khalid University Hospital, among women's who had Gestational age of 37 weeks or more had raised odds of vaginal birth when compared to women's with gestational age less than 37 weeks after IOL. And Nulliparous women had raised odds of CS compared with multiparous women and according to these study there was no association between Bishop Score more than 5 and successful IOL (13).

A study conducted in Iran Parity and Bishop Score were no significant relationship with success rate of induction, whereas there is significant relationship between numbers of pregnancy with success of induction (20). And study conducted in Pakistan Aga Khan Hospital parity, Bishop score, and gestation age had significant association with the outcome of Induction of Labor (24).

Study conducted in Kenyatta national hospital, Maternal parity showed a statistically significant association with successful induction of labor and high pre-induction Bishop scores

were associated with higher success rates for labor induction with 85.2% of patients with Bishop score above 6 were successfully inducted compared to 60.4% of patients with lower scores (18).

In Ethiopia a cross sectional study conducted in Wolliso St. Luke, Catholic Hospital, among women's who undergone IOL gestational age (<42 weeks) has an increase in chance of successful induction of labor for about 9.47 times compared to the mothers who had underwent induction with gestational age having greater than to 42 week, Bishop score and membrane rapture before induction showed significant association to the success of induced labor (5). According to cross section study conducted in Wolaita Sodo, Bishop score greater than five were positively associated with successful induction of labor (21).

A two years retrospective study conducted in Jimma University Specialized Hospital among mothers who undergone induction primigravida women's were 2.3 times more likely to have failed induction. And those women who had unfavorable Bishop Score were 5.3 times more likely to have failed induction outcome. Moreover, those women with intermediate Bishop Score at admission were 4.3 times more likely to have failed induction compared to those women with favorable Bishop Score at admission (12).

2.3.3 Health Indication of Induction

A cross sectional study on women admitted for labor induction in Aga Khan Pakistan, pre labor rupture of membranes were significant risk factors for emergency caesarean sections(24). Another study conducted in Farrara hospital of India patients affected by mild preeclampsia had a three times higher risk for failed outcome of induction (19).

In a study conducted in Wolliso, Women who had membrane rapture were more likely to have success for vaginal delivery when compared with those who had not (5).Another research conducted in Hawassa the odds of failed induction were 5.66 times more likely in mothers with premature rapture of and the odds of failed induction were 4.52 times more likely in mothers with post term and the odds of failed induction were 5.6 times more likely in mothers with previous bad obstetric complication were to have failed induction (22).

2.3.4 Fetal Conditions

According to study conducted in Kenyatta national hospital Infants less than 4000grams were 72.8% of success rate of vaginal deliveries (18). A study conducted in Jimma University Specialized Hospital among mothers who undergone induction Neonatal weight showed statistically significant association with the outcome of induction (12). Another study conducted in Hawassa suggests that Apgar score ≤ 7 at first minute were significantly associated with the success of induction of labor (22).

A Facility based, retrospective cross sectional study was conducted in Wolliso St. Luke Catholic Hospital The newborn who's APGAR score were >7 had 2.52 times more likely to had successful induced labor and those who had no fetal heart beat abnormality were 5 times more likely to be success as compared to the fetus with the presence of fetal heart beat abnormality (20). On the other hand study conducted in wolaita sodo success of induction was 64% times lower among women with fetal heart rate record of non-reassuring (21).

2.3.5 Method of Induction

Prostaglandins (PGE2) are an effective tool for cervix ripening and induction of labor. Misoprostol is very effective, Oxytocin administration is considered a safe method, but may be less effective with an unfavorable Bishop score (4).

A systematic review Searched from MEDLINE and Cochrane Library IV Oxytocin are less effective than vaginal and cervical PGE2 and Vaginal misoprostol is more likely to result in vaginal delivery vaginal or cervical PGE2 within 24 hours than to achieves vaginal delivery within 24 hours. As well as Oxytocin was associated with more CS deliveries than PGE2. vaginal misoprostol may reduce the likelihood of CS delivery Compared with IV oxytocin (25).

A study conducted on factors and outcomes associated with the induction of labor in Latin America the success rate of vaginal delivery was 69.9% and 74.8% for oxytocin and misoprostol respectively (8). as well as study conducted in Paropakar Maternity and Women's Hospital in Nepal The success rate of oxytocin was little higher than misoprostol and it was 71.1% and 64.9% respectively (14). according to study conducted in southwest Nigeria, suggest misoprostol induction was almost 4 hours shorter compared with oxytocin (17).

2.4 Conceptual Framework

Based on review of literatures done in different part of the world success of induction of labor can be affected by Socio demographic factors, method of induction used, health indication for induction, obstetric history and fetal condition as shown in figure. 1

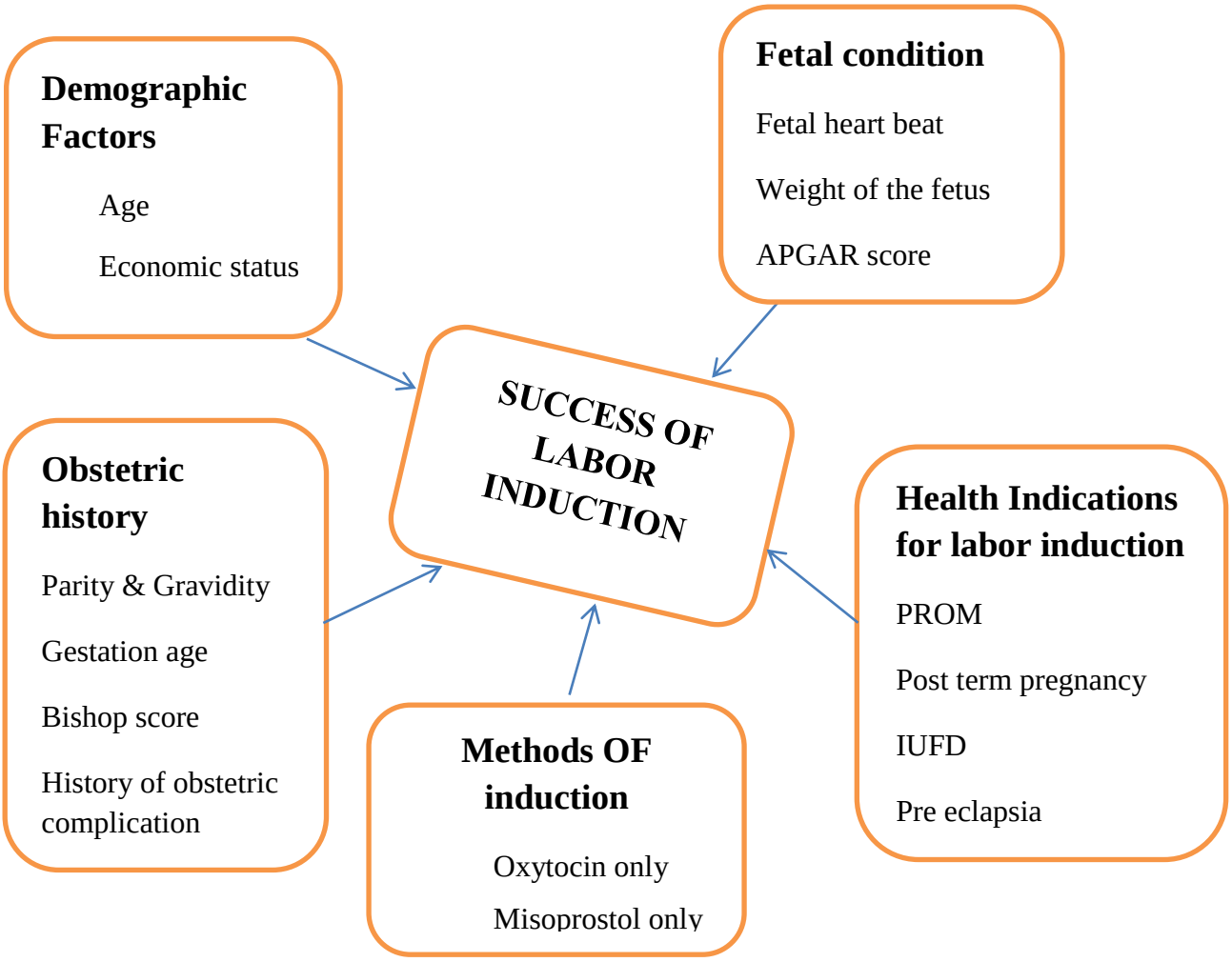

Figure 1. Conceptual framework for factors affecting success of induction of labor, constructed after reviewing literatures (7, 13, 19, 20, 25).

3. OBJECTIVE

3.1 General objective

To assess the prevalence and factor associated with successful induction of labor among mothers delivered in Debre Berhan Comprehensive Specialized Hospital from 2018 to 2019 GC

3.2 Specific objectives

1. To determine prevalence of successful induction of labor among mothers delivered in Debre Berhan Comprehensive Specialized Hospital from 2018 to 2019 GC
2. To identify the factors associated with success of induction of labor among mothers delivered in Debre Berhan Comprehensive Specialized Hospital from 2018 to 2019 GC.

4. MATERIALS AND METHODS

4.1 Study area and Period

The study was conducted in Debre Berhan Comprehensive Specialized Hospital in Debre Berhan town which is 130 km north from Addis Ababa the capital city of Ethiopia. Debre Berhan Comprehensive Specialized hospital was first established 1929 E.C. The hospital provides full range of healthcare services for out-patients and in-patients. The hospital has expected to serve more than 3 million peoples in its catchment area. It has 426 health care professionals, 154 beds in different departments and 8 wards giving inpatient and outpatient services to customers. Obstetric ward is one of areas in which mothers get different type of services, during study period which service is given by 4 obstetricians, 3 General Practioners, 1 IESO, 24 Midwifery's and 17 post and prenatal beds. This study was conducted from February to March 30, 2020.

4.2 Study Design

Institutional based retrospective cross-sectional study was employed.

4.3 Study Population

4.3.1 Source Population

The source population of the study was all women who had undergone induction of labor in Debre Berhan Comprehensive Specialized Hospital.

4.3.2 Study Population

The study population of the study was all selected documents of mother who undergone induction of labor at Debre Berhan Comprehensive Specialized Hospital from January 2018 to December 2019 GC

4.4 Eligibility Criteria

4.4.1 Inclusion Criteria

All women's who delivered at gestational age of 28 weeks and above through induction of labor in Debre Berhan Comprehensive Specialized hospital from January 2018 to December 2019 GC

4.4.2 Exclusion Criteria

All registered women who had induction without full document.

4.5 Sample Size Determination

To determine the sample size, single population proportion formula was used:

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

$$n = \frac{(1.96)^2 \, 0.597(1-0.597)}{(0.05)^2} = 368$$

Where: n = sample size, Z = standard normal distribution corresponding to significance level at $\alpha = 0.05$, p = proportion of labor induction success, "P", proportion of successful induction of labor was assuming to be 59.7% which was derived from study conducted in Wolaita Sodo, South Ethiopia.(21).

Based on this, the sample size became 368 and by adding 10% for incomplete data the final sample size was 405.

4.6 Sampling procedures

There is no separate delivery registration book for induction of labor. Because of this all registration numbers of mothers who delivered through induction from January 2018 to December 2019 were selected from delivery registration document and got 2276 inducted mothers and prepare as a sampling frame.

By using this sampling frame a systematic random sampling procedure was used to choose the study participants.

By using the formula $K = \frac{N}{n} = \frac{2276}{405} = 5$

Where: K= length of interval from the first selected sample to the next to be selected in registration book, N = total population, n = sample size

Every five inducted women documents were picked from the prepared sampling frame. Lottery method was used to select the first sample from the first 5.

4.7 Data Collection Tool and Procedure

Information regarding demographic features, details of induction of labor (indication for induction, method of induction ,mode of delivery, and neonatal outcome) was collected from the induction register and medical record files and entered in a predesigned perform. Five BSC midwifes collected the data from February to March 30, 2020 GC.

4.8 Study Variables

4.8.1 Dependent Variable:

Success of induction of labor,

4.8.2 Independent Variables:

Women socio-demographic factors (Age, income)

Obstetric characteristics (parity, gravidity, gestational age, Bishop Score, history of obstetric complication)

Health indications for induction (post-term pregnancy, hypertensive disorders, PROM,)

Methods of induction (oxytocin only, PGE_2, misoprostol only,)

Fetal conditions (weight of fetus, Apgar score, fetal heartbeat,)

4.9 Operational Definitions

Induction of labor: artificial initiation of uterine contractions prior to its spontaneous onset after 28weeks of gestation.

Successful induction of labor: when a woman had achieved vaginal birth (either spontaneous or assisted by instrumental delivery) after labor was induced.

Failed induction of labor: when a woman delivered by caesarean section due to failure to acquire either adequate uterine contraction despite being on oxytocin drip for at least six hours or diagnosed as prolonged labor.

N**on-reassuring fetal heart rate:** Feta heartbeat of either below 120 beat per minute or above 160 beat per minute following induction of labor.

4.10 Data Quality Control

The principal investigator given two days training for data collectors and supervisor on the objective and relevance of the study, how to gather the appropriate information, procedures of data collection techniques and the whole contents of the checklists and also the whole procedure. The checklists were collected from data collectors each day and checks for any error, when there is error, appropriate measure was taken timely.

4.11 Data Processing and Analysis

Data was collected by using a structured questionnaire. To make the data entry easy the questionnaires was coded. After data collection, the principal investigator checks the questionnaires for completeness consistency and clarity. Data was entered to Epi data version 3.1 and exported to SPSS version 22.0 and the data also cleaned and explored for outliers, missed values and any inconsistencies and analyzed using SPSS.

Analysis of data involves descriptive statistics i.e. frequency distribution, mean, standard deviation, proportions and cross tabulations. Bivariate analysis was carried out to determine the association of different socio-demographic and obstetric parameters and the successful induction processes and p-value of less than or equal to 0.25 was taken as a cut-off point to select candidate variables for the final multivariate logistic regression models. Independent predictors were determined using adjusted odds ratio with 95% confidence interval in multivariate regression analysis at p-value of < 0.05.

4.12 Ethical Consideration

Ethical clearance letter to carry out the study was obtained from Debre Berhan University College of health science, ethical review committee and letter of cooperation will be written from department of public health to the Debre Berhan Comprehensive Specialized hospital. After getting permission from the hospital administration, Confidentiality was ensured for the information by not recording the name of the respondent or other identifiers. The information collected was handled confidentially data will be used for the intended purpose only and anonymity was kept during data processing and report writing.

4.13 Dissemination plan

The finding of the study will be presented and submit to the Debre Berhan University department of public health in the partial fulfillment for master of public health in Reproductive Health. The Hard copies of this study will be distributed to Debre Berhan comprehensive specialized hospital and other concerned bodies including the Ministry of Health. The findings will also be communicated to local health planners and other relevant stakeholders to enable them take recommendations in to consideration during their planning process. Publication in national or international journals will also be considered.

5. RESULT

5.1 Socio-demographic characteristics of the study participant

During the study period a total of 405 mother's document was reviewed. From these more than half of women 213 (52.6%) were in the age group 25-34 years and 148 (36.5%) were 15-24 age in years. From those greater proportion 263 (64.9%) of the women's were Orthodox Christian in religion and majority of participants 286 (70.8%) belongs to Amhara in ethnicity in addition more than half of participants 226 (55.8%) were from urban residence. Almost all 400 (98.8%) of the study participants were married and 136(33.6%) were from grade 9 to 12 followed by (32.6%) grade 1 to 8 in educational status (Table 1).

Table 1, Socio demographic characteristics of women's who undergone induction of labor from 2018 to 2019 in Debre Berhan comprehensive specialized hospital (N=405).

Variables		Frequency	Percentage
Age	15-24	148	36.5
	25-34	213	52.6
	Greater than 35	44	10.9
Marital status	Married	400	98.8
	Others*	5	1.2
Religion	Orthodox	263	64.9
	Muslim	92	22.7
	Protestant	50	12.3
Ethnicity	Amhara	286	70.6
	Oromo	81	20
	Afar	38	9.4
Residential address	Urban	226	55.8
	Rural	179	44.2
Education	Can't read and write	53	13.1
	1-8	132	32.6
	9-12	136	33.6
	Diploma and above	84	20.7

*= single, widowed, divorced

5.2 Obstetric characteristics of the study participant

The study showed that about 90.9% of laboring mother had ANC follow-up during their pregnancy More than half of study participants were multigravida 219 (54.1%) and 205 (50.6%) were multipara women's. According to their gestational age, majority of the women accounts about 218 (53.8%) was at 37-40 weeks of gestation. The mean diastolic blood pressure at admission was 83 mmhg with standard deviation of 15.4 (Table 2).

Table 2. Obstetric condition of women who undergone induction of labor from 2018 to 2019 in Debre Berhan comprehensive specialized hospital (N=405)

Obstetric Characteristics	Frequency	Percentage
ANC follow up		
Yes	368	90 9
No	37	9.1
Source of referral		
Self	86	21.2
Health center	313	77.3
Hospital	6	1.5
Number of previous delivery		
Primipara	200	49.4
Multipara	205	50.6
Number of previous pregnancies		
Primigravida	186	45.9
Multigravida	219	54.1
Gestational age		
Less than37 wks.	76	18.8
37-40 wks.	218	53.8
Greater than 40wks	111	27.4
Blood pressure		
< 90mmhg	254	62.7
≥90mmhg	151	37.3

5.3 Indication and methods for induction of labor

Among the included 405 study participants, there were different reasons for induction of labor and out of this PROM takes the largest share that account about 195 (48.1%) followed by hypertensive disorders of pregnancy and post term 24.7% and 22.2% respectively. Regarding to bishop Score about 249 (61.5%) of women's were favorable bishop. Almost all (98.3%) of women's had been received intravenous oxytocin infusion as a method for induction while rest was received vaginal misoprostol. Non-reassuring fetal heart rate were recorded in 92 (22.7%) of the cases following induction of labor.

At birth 167 (41.2%) male and 238 (58.8%) female neonates were delivered. Out of the total delivery 267 (65.9%) were through spontaneous vaginal delivery, while the rest 138 (34.1%) were delivered through Cesarean section. The major cause for CS delivery was fetal distress 65 (47.1%) following failed induction of labor 45 (34.1%). From those delivered by both spontaneous vaginal delivery and caesarian section 373 (92.1%) neonates were alive. Regarding to weight of neonates 331 (81.7%) had weight of greater than 2500gram (Table 3).

Table 3. Obstetric condition before and after induction of labor in women's who undergone induction of labor from 2018 to 2019 in Debre Berhan comprehensive specialized hospital

VARIABLES		FREQUENCY	PERCENTAGES
Type of induction	planned	215	53.1
	Emergency	190	46.9
Indication for induction	PROM	195	48.1
	Hypertensive disorders	100	24.7
	post term	90	22.2
	Others*	20	5
Bishop score	favorable	249	61.5
	un favorable	156	38.5
Uterine hyper stimulation	Yes	7	1.7
	No	398	98.3
NRFHB following induction	yes	92	22.7
	No	313	77.3
Indication for CS	Fetal distress	65	47.1
	Failed induction	47	34.1
	Others**	26	18.8
Sex of neonate	Male	167	41.2
	Female	238	58.8
Newborn status	Alive	373	92.1
	Still birth	32	7.9
Weight of Neonate	Less than 2500g	74	18.3
	Greater than 2500g	331	81.7
APGAR score at first 5 minutes	Less than 7	90	22.2
	Greater than 7	315	77.8

* = IUFD, Diabetic mellitus and IUGR, previous still birth ** = malposition, Uterine rupture

5.4 Success of induction of labor

The study showed that among the total 405 women's 267(65.9%) [95%CI: 61.7-70.4] were delivered through spontaneous vaginal delivery (Figure 2).

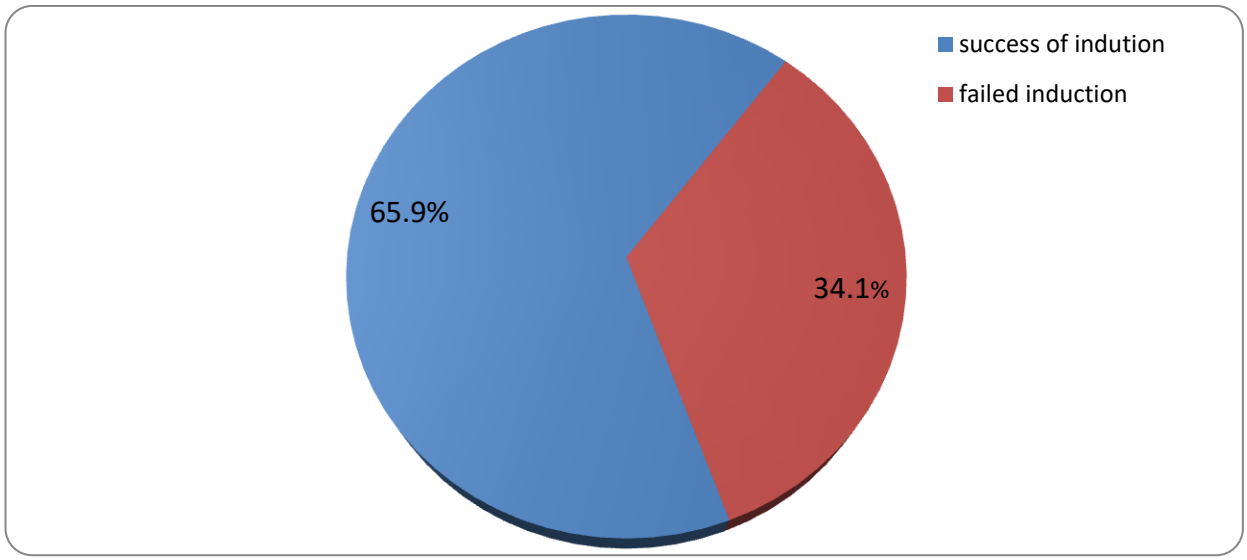

Figure 2. Prevalence of successful induction of labor among women's who undergone induction of labor from 2018 to 2019 in Debre Berhan comprehensive specialized hospital

5.5 Associated factors for Successful Induction of labor

Bivariate and multivariable logistic regression analysis method showed that there are different variables that were assumed to be associated with successful induction of labor. In this study Age, numbers of pregnancies, number of previous delivery, bishop score, religion, indications for induction, and diastolic blood pressure have significant association on the bivariate analysis.

However; Multivariate logistic analysis shows only diastolic blood pressure at admission and number of pregnancy had significant association with success of induction. Related to these the odds of successful induction were 2.4 times [AOR=2.47 (95%CI: 1.35-3.05)] more likely in multigravida's than primigravida women's. Furthermore, women's who had diastolic blood pressure less than 90 mmhg at admission were 2 times [AOR= 2.08 (95%CI: 1.12-3.86)] more likely to have successful induction outcome than women's with a diastolic blood pressure greater than 90mmhg.

Table 4. Factors associated with successful induction of labor among women who undergone induction of labor from 2018 to 2019 in Debre Berhan comprehensive specialized hospital.

Variable	Variable class	Success of Induction				
		Yes	No	COR (95%CI)	AOR (95% CI)	P-value
Age(years)	**15-24**	87(58.8%)	61(41.2%)	1	1	
	24-35	150(70.4%)	63(29.6%)	1.66(1.07-2.59)	1.19(.744-1.94)	0.457
	>35	30(68.2%)	14(31.8%)	1.50(.736-3.06)	.885(.406-1.93)	0.759
Religion	**Orthodox**	180(68.4%)	83(31.6%)	2.00(1.08-3.69)	.922(.543-1.56)	0.763
	Muslim	61(66.3%)	31(33.7%)	1.81(.899-3.67)	.543(.285-1.03)	0.062
	Protestant	26(52.0%)	24(48.0%)	1	1	
Bishop score	**Favorable**	170(68.3%)	79(31.7%)	.764(.502-1.16)	.893(.574-1.38)	0.614
	Un-favorable	97(62.2%)	59(37.8%)	1	1	
Diastolic Blood pressure	**<90mmhg**	158(62.2%)	96(37.8%)	1.57(1.01-2.44)	2.08(1.12-3.86)	0.020*
	≥90mmhg	109(72.2%)	42(27.8%)	1	1	
Number of pregnancy	**Multigravida**	162(74.0%)	57(26.0%)	2.19(1.44-3.33)	2.47(1.35-3.05)	0.041*
	Primigravida	105(56.5%)	81(43.5%)	1	1	
Number of delivery	**Multipara**	152(74.1%)	53(25.9%)	1.05(.253-4.39)	1.43(.790-2.58)	0.238
	Primipara	115(57.5%)	85(42.5%)	1	1	
Indication for Induction	**Post term**	64(71%)	26(28.9)	1.05(.253-4.39)	1.51(.320-7.16)	0.601
	PROM	124(63.6%)	71(31.7%)	.748(.188-2.98)	1.17(.257-5.36)	0.836
	Hypertensive disorders	66(66%)	44(44%)	.832(.202-3.42)	.813(.189-3.49)	0.781
	Others	13(65%)	7(35%)	1	1	

* = statistical significant at p-value of less than 0.05

6. DISCUSSION

In this study from the total of 405 women's who undergone induction of labor 267(65.9%) women's had successful induction outcome. This finding is comparable with studies done in Jimma, Kenya and Southwest Nigeria (12,17,18). This result was higher than study done in Wolliso, wolaita Sodo (5,21) and also South Africa (16). However, it is lower than study conducted in Hawassa, Saudi Arabia, Pakistan, India and North west Iran (13,20,21, 23,25). This difference might be due to variation in hospital setup and facilities and also difference in methods of induction, oxytocin infusion is used as a method for induction in the study area while in other cases misoprostol and PGE2 was used as common methods for induction.

In this study, the most common indication for induction was PROM (48.1%) followed by hypertensive disorders in pregnancy (24.7%). This finding is in line with a study done in jimma, Wolliso, Hawassa, and Army referral hospital Addis Ababa which is PROM takes the largest share from the indications (5,22,23). Whereas study conducted in Saudi PROM was the third frequent indication for induction (13). This difference might be the due to difference in the socio-economic status of women's living in two countries. In fact PROM is more common in low socioeconomic societies that affect the strength of the membranes due to nutrition and infection conditions.

This study disclosed that Almost all (98.3%) women's had received IV oxytocin infusion for induction of labor. This result is similar with study done in Addis Ababa and Wolaita Sodo which is oxytocin IV infusion was exclusively used method for induction (21,23). This finding also comparable with study done in Latin America where oxytocin IV infusion was used in about 90% of all labor inductions (8). Study conducted in Hawassa Public Health Facilities the mostly used method of induction was oxytocin infusion (72.8%) and 26.5% of women's received oral or vaginal misoprostol (22). This may be due to use of oxytocin as the most common method for induction of labor is due to its availability and fact that misoprostol is used as common method of induction when the fetus is not alive.

This study showed that number of pregnancies was significantly associated with successful induction of labor; the odds of successful induction were 2.4 times more likely in multigravida's than primigravida women's. This result is in line with study done in Iran which

is significant relationship between numbers of pregnancy with success of induction (20). Another study conducted in Jimma among mothers who undergone induction primigravida women's were 2.3 times more likely to have failed induction outcome (12).

The study also showed that maternal diastolic blood pressure at admission were significantly associated with successful induction of labor, those women's who had diastolic blood pressure less than 90 mmhg were 2 times more likely to have vaginal delivery than women's with a diastolic blood pressure greater than 90mmhg. This result was in lined with study conducted in Farrara hospital of India mothers who affected by mild preeclampsia had a three times higher risk for CS delivery (19). This may be due to mother's who have diastolic blood pressure of greater than 90 mmhg may have associated to preeclampsia or others hypertensive disorder of pregnancies this leads to fetal hypoxia resulting failed induction or CS delivery.

However; In this study there is no significance association between bishop score and the success of induction while another studies conducted in wolliso, jimma, Addis Ababa and Pakistan bishop score was strongly associated with the induction of labor (5,12,23,24). In fact bishop score is a pre labor scoring system it shows the condition of the cervix at the start of induction and it is an important predictor for a success of induction. This variation of result may be due to gap in assessment and documentation of bishop scores in the study area.

7. LIMITATION OF THE STUDY

The study was limited by the retrospective use of a database, allowing only the available variables to be used.

The study was conducted in one hospital and these results may not be representative of the entire country.

8. CONCLUSION

This study revealed that two out of three women's who undergone induction of labor had successful induction outcome. PROM is the most common indication for induction followed by hypertensive disorder of pregnancy. Almost all inductions were takes place through oxytocin IV infusion.

Regarding to factors that affect success of induction, Number of pregnancies and diastolic blood pressure at admission have significant association. The odds of successful induction were 2.4 times more likely in multigravida's than primigravida women's and also those women's who had diastolic blood pressure less than 90 mmhg were 2 times more likely to have successful induction outcome.

9. RECOMMENDATIONS

For Health care providers

- The health care provider should give counseling to the mothers and asses the cervix by using the Bishop Score and document the scores that woman's got before undergoing induction to provide quality of care in the induction areas.

For the hospital

- The hospital should set clear bishop score systems on the induction chart. In addition, it should have a follow-up and evaluation on the assessment and documentation of bishop score.

For Researchers

- Future research should be made on induction of labor at national level to provide data for evaluating and monitoring important intervention, and provide information for health services provision

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ANNEXES

Preform For Collecting Data on Induction of Labor

Participant ID#_____ Date _____

Please tick or enter in the appropriate space.

Part 1. Socio-Demographic characteristics

NO	QUESTIONS	ANSWER AND CODS	GO TO
101	Age in years	_____In Years	
102	Marital status of women?	1. Married 2. Single 3. Divorced 4. Widowed 9. Didn't recorded	
103	Religion of the women?	1. Orthodox 2. Muslim 3. Protestant 4. Others(specify) 9. Didn't recorded	
104	Ethnicity of the women?	1. Amhara 2. Oromo 3. Afar 4. Others (specify) 9. Didn't recorded	
105	Residential address of the women?	1. Urban 2. Rural 9. Didn't recorded	
106	Educational level of the women?	_____ 9. Didn't recorded	

Part 2. Obstetric Characteristics

No	QUESTION	ANSWER AND CODES	GO TO
201	Number of previous birth excluding current delivery	1. Primi Para 2. Multi Para	
202	Number of previous pregnancies	1. Primi Gravida 2. Multi Gravida	
203	Gestational age(wk.) based on LNMP	_____ Unknown LNMP	
204	Have ANC follow up?	1. Yes 2. No	
205	Blood pressure at admission	_____mmHg	
206	Weight of new born in gram.	_____gm.	

Part 3; Induction of labor

S.N	QUESTION	ANSWER AND CODE	GO TO
301	Type of indication	1. Planned 2. emergency 9. Didn't mentioned	
302	Indication of induction	1. Post term 2. PROM 3. Hypertensive disorders 4. IUGR 5. Others specify 9. Didn't recorded	
303	Membranes already ruptured before induction	1. Yes 2. No 9. Didn't recorded	
304	Method of induction	1. Oxytocin only 2. Misoprostol only. 3. Oxytocin with cervical	

		repining 4. Artificial rupture of membrane	
305	Bishop's score before induction started	1. favorable 2. un favorable	
306	Uterine hyper stimulation present (as recorded in notes)	1. Yes 2. No 9. Didn't recorded	
307	Non-reassuring Fetal heart rate following induction of labor	1. Yes 2. No 9. Didn't recorded	
308	Change of color of liquor to meconium stained	1. Yes 2. No 9. Didn't recorded	
309	Time from start of induction to delivery of labor? .	_____ 9. Didn't recorded	
310	Mode of delivery	1. Vaginal delivery 2. Caesarean section	
311	If delivery by caesarean section, indication:	1. Failed induction of labor 2. Fetal distress 3. Malposition 4. Others 9 Didn't recorded	
312	Ruptured Uterus present	1. Yes 2. No 9. Didn't recorded	
313	Newborn Status at birth	1. Alive 2. still birth 9. Didn't recorded	
314	Apgar score	_____	
315	Perinatal death	1. Yes 2. No	