

Outcome of Labor Induction and its Associated Factor among Laboring Women at Dilchora Referral Hospital, Dire Dawa, Eastern Ethiopia

Abel Shiferaw^{1*}, Tesfaye Assebe², Melake Demean³, Abeselom Assefa⁴

¹Dire Dawa Regional Health Bureau, Dire Dawa, Ethiopia; ²Department of Public Health, Haramaya University, Harar, Ethiopia; ³Department of Public Health, Haramaya University, Harar, Ethiopia; ⁴Saint Paul's Hospital Millennium Medical College, Ethiopia

ABSTRACT

Background: Induction of labor has a great role to prevent neonatal and maternal mortality and morbidity. Despite its role Induction sometimes fails with a potential risk of increased maternal and neonatal mortality and morbidity. In Dire Dawa, there was no study done on the outcomes of labor inductions. Therefore, this study is planned to fill this gap by studying the outcome of labor induction and associated factors among women who had delivered at Dilchora referral hospital in Dire Dawa, East Ethiopia.

Objective: To determine the outcome of labor induction and associated factors among women who had delivered at Dilchora referral hospital Dire Dawa East Ethiopia, May 15 to June 1, 2020.

Methods: Hospital-based retrospective cross-sectional study (July 8, 2014, up to July 08, 2019) was employed by using a pre-tested structured questionnaire to collect data from a sample of 444 charts using a systematic random sampling method by trained data collectors. First, bivariate analysis was done to select variables for multivariate analysis, and those variables with a p-value of 0.25 or less interred into multivariate analysis. In multivariable analysis, those variables with a p-value <0.05 are considered significantly associated. The model adequacy was checked by using the Hosmer and Lemeshow goodness of fit test.

Result: The result of the study revealed that Post-Term mothers [(AOR: 0.49 (0.25-0.98).The mother whose labor is induced by misoprostol [(AOR: 2.5 (1.08-5.94)] the mother whose labor is induced by both (oxytocin and misoprostol) [(AOR: 0.33 (0.13-0.86)] and non-reassuring fetal heart rate pattern [(AOR: 0.10(0.03-0.30)] were significantly associated with the success of induction.

Conclusion: The prevalence rate of success of labor induction was found (83.6%). And the most common indications for labor inductions were PROM and Post term. Furthermore, the study described that the most common method of induction in Dilchora referral Hospital is iv oxytocin and the minister of health should develop national evidence-based clinical practice guidelines for the labor of induction and enforce its implementation.

Keywords: Induction of Labour; outcome; associated factor; Gestational age

INTRODUCTION

Induction of labor refers to the iatrogenic stimulation of uterine contractions before the onset of spontaneous labor to accomplish vaginal delivery [1]. It is usually performed by administering oxytocin or prostaglandins to the pregnant woman, or by artificially rupturing the amniotic membranes [2]. and it is indicated only when the risk of continuing the pregnancy to the mother and/or fetus exceeds the risk associated with the induced labor and birth [3]. Induction of Labor is not risk-free, and many women

find it uncomfortable. the incidence of inducing labor Over the past several decades has continued to rise. In developed countries, the proportion of infants delivered at term following induction of labor can be as high as one in four births. In low- and middle-income countries the rates are generally lower, but in some low-income countries, they can be as high as those observed in high-income countries [2].

An increased rate of induction of labor for post-term pregnancies over 15 years was associated with decreased stillbirth rates in Canada [4]. For a long period, many health care providers have

Correspondence to: Abel Shiferaw, Dire Dawa Regional Health bureau, Dire Dawa, Ethiopia, Tel: +251932171531, E-mail: shifrawabel@gmail.com

Received: 15-March-2022; **Manuscript No.** GOCR-22-16267, **Editor assigned:** 17-March-2022, **PreQC No.:** GOCR-22-16267(PQ); **Reviewed:** 29-March-2022, **QC No.** GOCR-22-16267; **Revised:** 09-April-2022 (R); **Manuscript No.** GOCR-22-16267; **Published:** 20-April-2022; **DOI:** 10.35248/2161-0932.22.12.595

Citation: Abel S, Tesfaye A, Melake D, Abeselom A (2022). Outcome of Labor Induction and its Associated Factor among Laboring Women at Dilchora Referral Hospital, Dire Dawa, Eastern Ethiopia. *Gynecol Obstet (Sunnyvale)* 12:595

Copyright: ©2021 Abel S, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

recommended the use of induction of labor in circumstances in which the benefit of continuing a pregnancy must be outweighed the potential maternal and fetal risk associated with the procedure and waiting for the onset of spontaneous labor. These circumstances generally include gestational age of 41 completed weeks or more, pre-labor rupture of amniotic membranes, hypertensive disorders, maternal medical complications, fetal death, fetal growth restriction, chorioamnionitis, multiple pregnancies, vaginal bleeding, and other complications. Following this condition, many neonates and mothers die each hour throughout the world to prevent maternal and neonatal death WHO designed and implement a strategy in the area of improving and availing comprehensive emergency obstetric services. one of the strategies is the induction of labor [2].

In Dire Dawa, there was an area with a high rate of maternal mortality and morbidity MMR calculated for the two periods (2013-2015) was 511 and 505 per 100,000 live births during baseline and trial periods, respectively [5]. That maternal mortality is due to poor access to comprehensive emergency obstetric care. Knowing labor outcome and associated factors following induction is crucial. To the investigator's knowledge, there is no study conducted in the Dilchora referral hospital. Therefore, this study aimed to determine the outcomes of induction of labor and factors associated with induction of labor at Dilchora referral hospital.

Identifying the magnitude and factors associated with labor induction outcomes will emphasize improvements in access to qualified care for laboring women that are necessary for a reduction in maternal life-threatening conditions. Since the labor induction outcomes, exploring and analyzing the severity of factors provides important information for laboring women as well as for health care providers in setting priorities for in-depth assessments and health care improvements in maternal health. Furthermore, studies on labor induction outcomes-related events in the study area are crucial to further understanding associated issues and provide an evidence-based platform for appropriate interventions.

Since the study will explain factors associated with labor induction outcomes, study results will serve as an input for the health bureaus,

health offices/departments, local NGOs, and other stakeholders working in Dire Dawa city administration in the planning and implementation of preventive and intervention strategies to improve maternal and neonatal health. Moreover, the study can also be used as a baseline framework for researchers for further studies that will be conducted in similar setups.

MATERIAL AND METHODS

Study setting

A hospital-based cross-sectional study was carried out from May 15 up to June 1, 2020, in Dilchora referral hospital. The hospital gives a referral service for different parts of the Oromiya and Somalia region. According to data from the hospitals' labor ward registration book more than 400 inductions has been conducted in 2018. The average monthly delivery service on Dilchora referral hospital in 2018 GC is about 325. So far, there have not been any properly documented studies to show induction of labor, its associated factor, and labor outcome.

Population sampling

The source population was All women who had induction of labor and gave birth after 28 weeks of gestation in Dilchora referral hospital and the study population was All women who had an induction and gave birth after 28 weeks of gestation in the Dilchora referral Hospital during the study period. All registered women who delivered through induction of labor after a period of viability (28 weeks) were included in this study.

Sampling size and sampling technique

The sample "size of outcome variable" for induction of labor is calculated using single population proportion formula considering the following assumptions: the level of confidence of 95%, the margin of error of 4%, proportion of success of labor induction from the previous study to be 78% [7], By adding 10% of the non-response rate the final sample size will be $404 + 40 = 444$. A

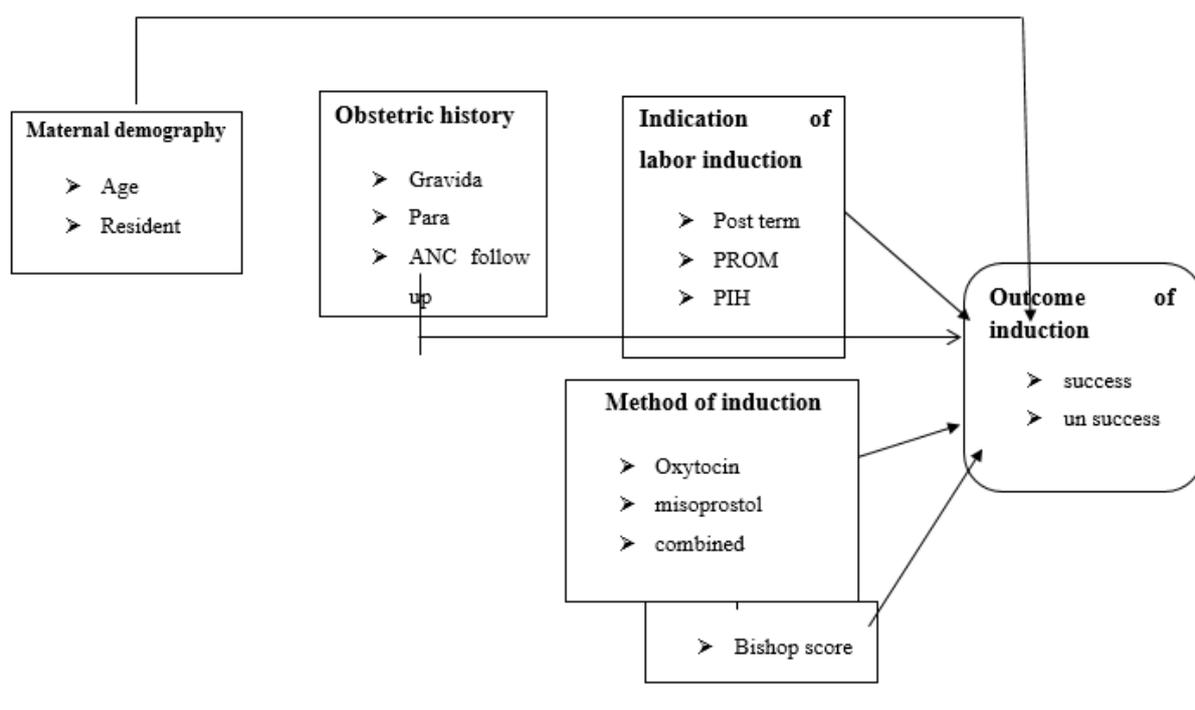


Figure 1: Based on various literature reviews Conceptual framework for the outcome of induction of labor and associated factors are developed.

Table 2: Table showing the distribution of Gestational Age at Delivery in women with polyhydramnios.

Gestational Age	No. of Patients
28-31 weeks	13
32-36 weeks	17
37-40 weeks	68
>40 weeks	2
TOTAL	100

Maximum number of women (68%) delivered at 37-40 weeks of gestation

Most of the cases of preterm delivery were associated with congenital anomalies. Only 5/57 cases (8.77%) of idiopathic polyhydramnios were delivered preterm

The mean gestational age at delivery was 36.63 weeks

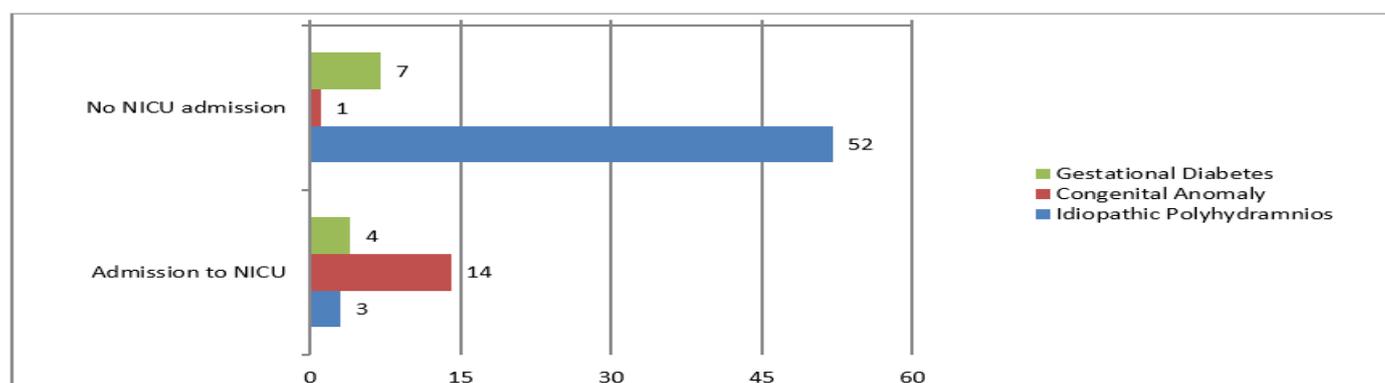
Only 2 patients were delivered after due date.

Table 3: Table showing the distribution of Women with polyhydramnios according to Mode of Delivery.

	Idiopathic	Gestational Diabetes	Congenital Anomaly	Total
Vaginal	24	5	25	54
Cesarean	32	7	5	44
Ventouse	1	-	-	1
Forceps	-	1	-	1
TOTAL	57	13	30	100

The overall rate of cesarean was 44%; Elective LSCS in 11 and emergency LSCS in 33 cases

In idiopathic polyhydramnios, a maximum no. of patients were delivered by cesarean section (n=32/57, 56.14%)

**Figure 2:** Distribution of neonates according to admission in Neonatal Intensive Care Unit.**Table 4:** Perinatal Outcomes in Polyhydramnios.

Perinatal Outcome	No. of Patients
Fetal Congenital Anomaly	30
IUFD	14
Birth Weight \geq 4kg	9
APGAR score<7 at Birth	17
Admission to NICU	21
Neonatal Jaundice	4

systematic random sampling procedure was used to choose the study participants using the delivery registration book k=Sampling interval from the first selected sample to the next to be selected in the registration book, N=total population (1334), n=sample size (444). The sampling interval (k) was calculated by dividing the total population to sample size (K=3), the sample was picked every three charts from the registration book. When there was a missing chart for the selected sample, we picked the next. The lottery method was used to select the first sample from the first three.

Data collection and procedure

Data was collected by using a structured data-collecting checklist

Table 5: Correlation of AFI with newborn birth weight and APGAR score.

Correlations of AFI with Birth Weight & APGAR Score				
		AFI	Birth weight	APGAR Score
AFI	Pearson Correlation	1	-0.452	-0.39
	Sig.(1-tailed)		<0.001	<0.001
	N	100	100	100
Birth weight	Pearson Correlation	-0.452	1	0.672
	Sig.(1-tailed)	<0.001		<0.001
	N	100	100	100
APGAR Score	Pearson Correlation	-0.39	0.672	1
	Sig.(1-tailed)	<0.001	<0.001	
	N	100	100	100

that was prepared and developed from previous studies Pretest of the questionnaire was done to 5% of the sample size to validate and customize the tool. Two midwifery professional, who are not working in the study sites was recruited as Data collector and one integrated emergency obstetric surgeon as supervisor. The data collector was oriented to the data collection format by the

supervisor and principal investigator on daily basis P.I and the supervisor reviewed all collected data and take corrective measures. Those midwives Who would be trained as data collectors were to collect the data on the data collection tool and procedures under the supervision of one integrated emergency surgeon and the principal investigator for their completeness, accuracy, and consistency. The data collector started data collection after reviewing the mothers' chart for legibility. Those mother medical charts not fulfill the inclusion criteria will be replaced by the next legible mother medical chart Based on the information obtained from the hospital delivery registration log books, and medical records a total of 444 patients' cards were filled.

Operational definitions

Failed induction: Failed induction is failure to initiate good uterine contraction. It is diagnosed if adequate uterine contractions are not achieved after 6 to 8 hours of induction [8].

The outcome of Labor Induction: Proportion of Success/Failure of Induced Labor. The success of labor induction: If a woman is delivered vaginally or by an instrument after induction with any of the methods. Unsuccess of labor induction: if a woman is delivered by C/S due to any indication for cs after starting of induction [9]. Bishop score: A group of measurements made at the internal examination, is used to determine whether the cervix is favorable or not. The score is based on the station of presenting part, dilation, effacement (or length), position, and consistency of the cervix. A score of 8 or more generally indicates that the cervix is ripe [2].

Data management and analysis

To keep the quality of data, detailed training is given to data collectors. day to day activities during data collection; supervised and evaluated errors were corrected by the investigator before the following day's activity. The checklist was pre-tested by taking 5 percent of the sample size in the same Hospital and necessary modification to the checklist was made based on the nature of the gaps identified. The collected data was checked for its completeness, entered using the epi-data 3.1 version, and exported to the SPSS-22 database program for analysis. Frequency distributions of both dependent and independent variables were done and presented by table and texts. To determine associated factors for induction and its outcome, logistic regressions were used. First, bivariate analysis was done to select variables for multivariate analysis, and those variables with a p-value of 0.25 or less were interred into multivariate analysis. In multivariable analysis, those variables with a p-value <0.05 will be considered as significantly associated. The model adequacy was checked by using the Hosmer and Lemeshow goodness of fit test.

Ethical considerations

Institutional ethical clearance was first sought from the Institutional Health Research Ethics Review Committee (IHRERC) at Haramaya University, College of Health and Medical Sciences. Next, a

permission letter was taken from Dire Dawa City administration Health Bureaus and health facility officials. Before the start of data collection informed, voluntary, written and signed consent will be taken from the facility head and confidentiality will be maintained and assured.

RESULT

Socio-demographic and obstetric Characteristics of the study participant

Documents of 444 labor induced were reviewed during the study period. The Chart retrieval rate was 100%. Of the total participants, 341(76.8%) were in the age group of 20-34 years with a mean (\pm SD) of 27 (\pm 5) years. The minimum and maximum ages of mothers in years were 16 and 39. Of the total participants, 258 (58.1%) live in rural.

Three hundred fifty-five (80%) of the women were multipara while 89(20%) were null-para. The study also revealed that 387(87.2%) of the participants had ANC follow-up during pregnancy and the rest 57(12.8%) had no ANC follow-up. 326 (73.4%) of the mother were gestational age of 37-41 weeks followed by gestational of >42 weeks 71(16%).

Before induction time 289(65.1%) of the women had bishop scores of 5-8, and the membrane was ruptured in 184 (41.4%) mothers. The study also shows that from the total of 444 fetuses, 423(95.3) of them had regular fetal heartbeat patterns during induction and 21 (4.7%) had developed no reassuring fetal-heart beat pattern (NRFHRP)after induction (Table 2).

Induction of labor

Reason and methods for induction of labor: The three most indications for inducing labor were PROM taking the highest frequency of 179(40.3%) followed by pregnancy-induced hypertension-160(36%) and post-term pregnancy 71(16). The methods of induction were either IV oxytocin infusion 212(47.7%), 169(38.1%) misoprostol, and 63(14.2%) both. (table 3)

Outcome of Labor Induction: Of the 444 women undergoing induction, 73(16.4%) were delivered by caesarean section while 371 {83.6% (95% CI: 80-87) achieved vaginal delivery. In this study The main aim of induction was to achieve vaginal delivery, all women delivered by cesarean section were considered unsuccessful in labor induction. (Figure 2).

Indication for cesarean section: The main reason for cesarean section was failed induction 28(38%) followed by fetal distress 19(26%) and cephalo-pelvic disproportion 14(19%), malposition, and prolonged labor 4(5%) and 8(11) respectively (Figure 3).

Associated factors for labor induction outcome

Associated factors for labor induction outcome during bivariate binary logistic regression: In bivariate analysis, the following factors Related to labor induction outcome; resident, post-term,

Table 1: Sample size calculation by considering the different factors that are associated with the success of labor induction.

Variable	percentage of outcome in the unexposed group	percentage of outcome in the exposed group	Sample size	Sample Size +10% non-response rate	Reference
Gestational age	47%	69%	179	197	(Abdulkadir et al., 2017)[6]
Mother Bishop	30%	66%	84	92	(Abdulkadir et al., 2017)[6]
Weight of new born	47%	69%	180	198	(Abdulkadir et al., 2017)[6]

Table 2: Socio-demographic and obstetrics Characteristics of Women Who Had undergone induction of labor and Gave Birth In Dilchora Referral Hospital From July 08, 2014-July 08, 2019.

Variable	Frequency (n)	Percentage (%)
Age		
<20	55	12.4
20-34	341	76.8
≥35	48	10.8
Residence		
Urban	186	41.9
Rural	258	58.1
Parity		
Null-para	89	20
Multi-para	355	80
ANC follow up		
Yes	387	87.2
No	57	12.8
Gestational Age		
Less than 36 week	47	10.6
37-41 week	326	73.4
≥ 42 week	71	16
Membrane status		
Intact	260	58.6
Ruptured	184	41.4
Bishop score		
less than/equal to 4	122	27.5
5-8	289	65.1
greater than/equal to 9	33	7.4
NRFHR		
yes	21	4.7
No	423	95.3

Table 3: Reason And Methods for Induction of Labor in Women Who had undergone induction of labor and Gave Birth in Dilchora Referral Hospital from July 08, 2014 -July 08, 2019.

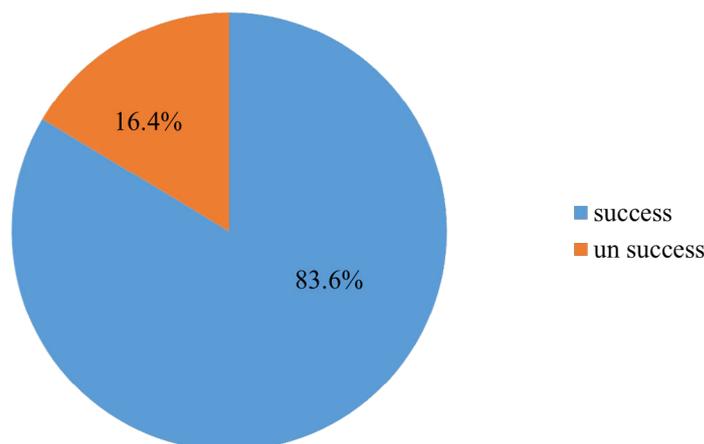
Variable	Frequency(n)	Percentage (%)
Reason for induction		
Post term(n=444)	Yes	71
	No	373
Prom(n=444)	Yes	179
	No	265
IUFD(n=444)	Yes	33
	No	411
Congenital anomaly(n=444)	Yes	21
	No	423
Method of induction		
Iv oxytocin	212	47.7
Misoprostol	169	38.1
Combined	63	14.2

PROM: Premature Rupture of Membrane, IUFD: Intra Uterine Fetal Death

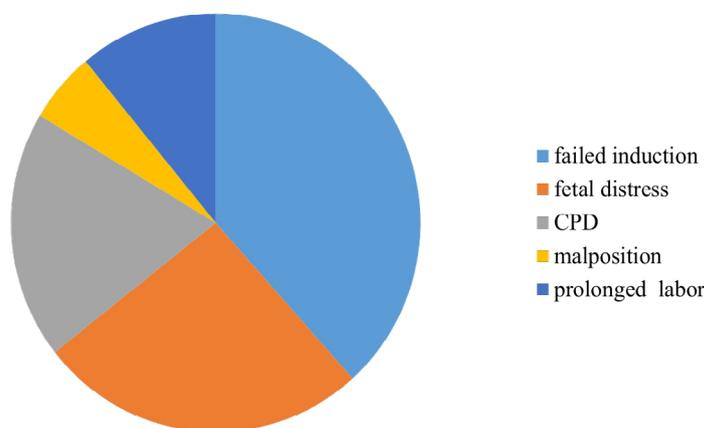
bishop score, method of induction, non-reassuring fetal heart rate pattern, para significant association with success of induction of labor.

The Mother from the rural areas had 2.29[COR=95% CI: 1.37-3.81] times more likely to have succeeded in labor induction than those in urban areas. The odds of success of labor induction were

Outcome of labor Induction

**Figure 2:** Outcome Of Labor Induction among Women Who Had undergone induction of labor and Gave Birth In Dilchora Referral Hospital From July 08, 2014-July 08, 2019.

Indication for CS

**Figure 3:** Indication for CS among Women Who had undergone induction of labor and Gave Birth in Dilchora Referral Hospital from July 08, 2014-July 08, 2019.

61% [COR=95% CI: 0.39(1.44- 4.67)] less likely in post-term pregnancy than in their counterparts. Moreover, those women with Bishop scores of 5-8 and ≥ 9 at admission were 2.5[(COR=95% CI:(1.47-4.26)] times and 1.99[(COR=95% CI: (0.71-5.60)] times more likely induction to be successful compared to those women with ≤ 4 Bishop Score at admission.

Mothers whose labor is induced using misoprostol were two times [(COR=95% CI: (1.04-4.06)] more likely to succeed than oxytocin. In contrast, the mother whose labor was induced using both (oxytocin and misoprostol) was 80 % [(COR: 0.20(0.1-0.37)] less likely to be successful than oxytocin. The odds of success of labor induction was 91%[(COR:0.081 (0.03-0.20)] less likely in mothers with non-reassuring fetal heart rate patterns than their counterparts. Multi-para women were 2.7 [(COR: (1.81-35.80)] times more likely to have success in labor induction than null-para women. The induction of labor in mothers whose babies' weight >2500gm was 59% [(COR: (0.16-1.07)] less likely to be successful than those with ≤ 2500gm (Table 4).

Associated factors for labor induction outcome during multivariate binary logistic regression: In multivariate analysis, being post-term, the induction method and having a non-reassuring fetal heart rate pattern have retained their significant association with successful induction. Post-Term mothers were 51% [(AOR: 0.49 (0.25-0.98)] less likely for induction to be successful compared to those women with term pregnancy.

The mother whose labor is induced by misoprostol where 2.5 [(AOR: (1.08-5.94)] times more likely to succeed in labor induction than those induced by oxytocin. In contrast, the mother whose labor is induced by both (oxytocin and misoprostol) was 67% [(AOR: (0.13-0.86))] less likely to be successful than that whose labor is induced by oxytocin. The odds of success of labor induction are 90% [(AOR: 0.10(0.03-0.30)] less likely in with non-reassuring fetal heart rate pattern than those of a regular fetal heart rate pattern during labor (Table 5).

DISCUSSION

Of 444 cards reviewed in this study 73(16.4%) of them were

delivered by cesarean section while 371 achieved vaginal delivery making the prevalence rate of success induction (83.6%) with (95% CI: 80%-87%). Post-term, Method of induction, non-reassuring fetal heart rate pattern had a statistically significant rate of success of induction in St. Luke Catholic Hospital (58%) and public hospitals of Mekelle town (76%) [10,11]. This could be because of the difference in the quality of induction care provided by the hospitals, skilled professionals, and different induction method practices in those setups (Abdulkadir et al., 2017). Related to the factors associated with the success of induction the study shows that induction of labor occurred mostly in multi Para mothers 80% compared to 20% in null-para mothers. Even if it does not show

Table 4: Bivariate Binary Logistic Regression Of Associated Factors For Labor Induction Outcome In Women Delivered In Dilchora Referral Hospital From July 08, 2014-July 08, 2019.

Variable	Outcome of Induction		COR(95%,CI)	P-value
	Successful	Unsuccessful		
Age				
<20	47 (85.5%)	8 (14.5%)	1.17(0.41-3.41)	0.767
20-34	284 (83.3%)	57 (16.7%)	0.99(0.44-2.24)	0.993
≥35	40 (83.3%)	8 (16.7%)	1	NA
Residential Address				
Rural	228 (88%)	30 (12%)	2.29(1.37-3.81)	0.002*
Urban	143 (77%)	43 (23%)	1	
Post-term				
Yes	50 (70%)	21 (30%)	0.39(0.21-0.69)	0.001*
No	321 (86%)	52 (14%)	1	
Bishop score				
8-May	253 (88%)	36 (12%)	2.50(1.47-4.26)	0.001*
>9	28 (85%)	5 (15%)	1.99(0.71-5.60)	0.192
<4	90 (74%)	32 (26%)	1	
Method of induction				
Misoprostol	156(92%)	13 (8%)	2.05(1.04-4.06)	0.038*
Combined	34 (54%)	29 (46%)	0.20(0.14-0.37)	0.001*
Oxytocin	181(85%)	31 (15%)	1	NA
NRFHRP				
Yes	7 (33%)	14 (67%)	0.08(0.03-0.21)	0.001*
No	364 (86%)	59 (14%)	1	NA
Para				
Multi Para	308(86.6)	47(13.4%)	2.7(1.56-4.89)	0.001*
Null Para	63(70.8)	26(29.2%)	1	
New born weight				
>2500gm	315 (82%)	68 (18%)	0.41(0.16-1.07)	0.069*
≤2500gm	56 (92%)	5 (8%)	1	

*: statistically significant at P-value <0.25, IUFD: Intrauterine Fetal Death, NRFHRP: Non Reassuring Fetal Heart Rate pattern

Table 5: Multivariate Binary Logistic Regression Of Associated Factors For Labor Induction Outcome In Women Delivered In Dilchora Referral Hospital From July 08, 2014-July 08, 2019.

Variable	AOR(95%,CI)	P-value
Residential Address		
Rural	1.68(0.91-3.10)	0.095
Urban	1	
post term		
Yes	0.49(0.25- 0.98)	0.044**
No	1	
Bishop score		
8-May	2.07(0.90-4.76)	0.086
≥9	1.53(0.40-5.82)	0.533

≤4	1	
Method of induction		
Oxytocin	1	
Misoprostol	2.53 (1.08-5.94)	0.033**
Combined	0.33(0.13-0.86)	0.022**
NRFHP		
Yes	0.10(0.03-0.30)	0.001**
No	1	
Para		
Multi Para	1.7 (0.94-3.47)	0.73
Null Para	1	
New born weight		

>2500gm	0.39(0.13-1.15)	0.088
≤2500gm	1	

** : statistically significant at P-Value ≤ 0.05, IUFD: Intrauterine Fetal Death, NRFHRP: Nonreassuring Fetal Heart Rate Pattern

the significance of association in multivariate analysis, multiparous mothers have two times more likely to have success in labor induction than null-para women. similar findings were reported in the study done in Public Hospital in Ethiopia and Dessie Referral Hospital: Northeast Ethiopia [12,13]. increased parity had a favorable bearing on the outcome of induction. Also, labor will prolong in primipara women because the cervix was not tested for labor [13].

This study's common indication for labor induction was PROM (40.0%) followed by post-term (16%). This is in line with the study done in public hospitals of Mekelle town PROM (41%) followed by post-term (19%). Contrasting to this the most common indication for labor Induction in Latin America was elective induction (30%) [14]. This difference is because of the two countries' socio-economic conditions and PROM was more common in low socioeconomic societies due to widespread nutrition and infection conditions that would facilitate the condition [14]. The study shows that post-term mothers were fifty-one percent less likely induction to be successful than those women with the term. A similar result was found in the previous study done in Wolliso St. Luke, Catholic Hospital, and The Aga Khan University Hospital, Pakistan shows term mothers had three and two times more likely to succeed in labor induction than post-term mothers [10,15]. This may be related to when the mothers became post-term (Gestational age>42 weeks) there would be respectively big fetus (macrosomia) or decreased placental insufficiency potentially causing fetopelvic disproportion and non-reassurance fetal heartbeats, for induction of labor to fail [10].

In this study, the most common method of induction was iv infusion of oxytocin (47.7) followed by misoprostol (38.1) This is in line with other studies done in the Tigray region, Ethiopia 51% of induction of labor was done by oxytocin infusion followed by misoprostol 49% .other Study conducted in Egypt shows 65.5% of the women received misoprostol while 34.4% received intravenous oxytocin infusion as a method of labor induction [16,17]. Another study was done in Latin America where oxytocin IV infusion was used in about 90% of all labor inductions [14]. The choice of whether to induce with oxytocin or misoprostol was more on their dependent on the favorability of the woman's cervix and misoprostol availability and protocol used within the unit [18]. The mother whose labor is induced by misoprostol were 2.5 times more likely to succeed in labor induction than those induced by oxytocin.) This is in line with another study done by Coronation Hospital and the University of the Witwatersrand, South Africa When compared with oxytocin, misoprostol was more effective for labor induction. The relative risk of failure to achieve vaginal delivery was 0.48 (95% CI 0.35 to 0.66). The mother whose labor is induced by both (oxytocin and misoprostol) was 67% less likely to be successful than that whose labor is induced by oxytocin.

The study also revealed that the presence of a non-reassuring fetal heartbeat pattern was significantly associated with the success of labor induction. The success of labor induction is ninety percent less likely in non-reassuring fetal heart rate patterns than in those having regular fetal heart rate patterns. This is consistence with a study done in Wolaita Sodo, South Ethiopia. The success of labor induction is sixty-four percent less likely with non-reassuring

fetal heart rate patterns than those having regular fetal heart rate patterns [17,18]. Another study conducted in Wolliso St. Luke, Catholic Hospital, South West Shewa, Oromia revealed that Cases who had no fetal heartbeat abnormality were five times more likely to be a success during induction of labor in contrast with those with abnormality [10]. This could be due to the presence of fetal distress causing a non-reassuring fetal heartbeat pattern and this sign is alarming to take immediate action to save the life newborn [18].

CONCLUSION

The prevalence rate of successful labor induction was found (83.6%). And the most common indications for labor inductions were PROM and Post-term. Furthermore, the study described that the most common method of induction in Dilchora referral Hospitals is IV oxytocin infusion. Variables that increased the likelihood of success of labor induction were post-term, method of induction, and non-reassuring fetal heart rate.

ACKNOWLEDGEMENT

First and foremost, I thank GOD for being with me.

I would also like to thank Haramaya University for giving me this chance to continue my master's education and also I would like to express my deepest gratitude to my Advisors Dr. Tesfaye Assebe and MR Melake Dementia for their constructive comments and suggestions throughout the preparation of this research.

My special thanks also go to my friend for his all-rounded, constant support and encouragement

CONFLICT OF INTEREST

The authors declared no conflict of interest concerning the research, authorship, and publication of this article.

CONTRIBUTION OF AUTHOR (AUTHORSHIP)

Abel Shiferaw conceived the study under the supervision of Tesfaye Assebe and Melake Demena. Abel Shiferaw wrote the original draft of the manuscript. Abel Shiferaw analyzed data and its interpretation. Tesfaye Assebe and Melake Demena supervised the proposal development, data collection, analysis, and overall work. Tesfaye Assebe and Melake Demena reviewed the draft manuscript for intellectual content and participated in the revision. All authors read and approved the final version of the manuscript.

REFERENCE

1. Cunningham F, Leveno K, Bloom S, Hauth J, Rouse D, Spong CY. Williams Obstetrics 23rd edition JAMA. (2010);304(4):474-475.
2. World health organization. WHO recommendations: induction of labour at or beyond term. World Health Organization. (2018).
3. SOGC. Guideline for induction of labour. national collaborating centre for women's and children's health. National Institute for Health and Clinical Excellence. (2008).
4. Vogel J, Gülmezoglu A, Hofmeyr G, Temmerman M. Global perspectives on elective induction of labor. Clin obstet Gynecol. 2014; 57(2): 331-342.
5. Tseyon T. Assessment of maternal death and factors affecting maternal death surveillance and response system in Dire Dawa, Ethiopia. 2015; 2: 8-9.
6. Abdulkadir, Dejene A, Geremew M, Dechasa B. Induction of labor

- prevalence and associated factors for its outcome at Wolliso St. Luke. Catholic Hospital, South West Shewa, Oromia. *Intern Med.* 2017; 7: 2.
7. Girma W, Tseadu F, Wolde M. Outcome of induction and associated factors among term and post term mothers managed at Jimma University Specialized Hospital: a two years' retrospective analysis. *Ethiop Journ health scien.* 2016; 26(2): 123-132.
 8. Federal Ministry of Health. (2010). Management protocol on selected obstetrics topics.
 9. Organization(WHO)., W. H. WHO recommendations for induction of labour: World Health Organization. (2011).
 10. Garang D, Angesom K, Araya M. Prevalence, outcomes and associated factors of labor induction among women delivered at public hospitals of mekelle. *BMC pregnancy and childbirth.* 2020
 11. Rade B, Mitku Y, Weldemicheal A, Zenebe Z, Desalegn A. Induction of Labor and Its Determinant Factors: Retrospective Cross-Sectional Study from a Public Hospital in Ethiopia. *J Preg Child Health.* 2018; 5: 2.
 12. Dilnessa T, Temesgen K, Workie A. The proportion of failed induction of labour and associated factors among women undergoing induction of labour in Dessie Referral Hospital: Northeast Ethiopia a cross-sectional study. *Asian Journ Preg Childbirth.* 2019; 1-13.
 13. Guerra G, Cecatti J, Souza J, Faúndes A, Morais S, Gülmezoglu A, et al. Factors and outcomes associated with the induction of labour in Latin America. *BJOG Internat Journ Obstet Gynaecol.* 116: 1762-1772.
 14. Khan N B, Ahmed I, Malik A, Sheikh L. Factors associated with failed induction of labour in a secondary care hospital. *J Pak Med Assoc.* 2012; 62: 6.
 15. Al-Shaikh, G., Wahabi, H., Fayed, A., Esmail, S., Al-Malki, G., & Al-Esmail, Factors associated with successful induction of labor. *Saudi Med J.* (2012); 33(3): 298-303.
 16. Ayuba I, Abhulimen O, Ekine A. Safety of Induction of Labour in the Niger Delta Region. *Greener J Med Sci.* 2012; 2:173-178
 17. Bekru E T, Yirdaw B E. Success of labour induction institution based cross-sectional study Wolaita Sodo, South Ethiopia. *Intern Journ Nurs Midwif.* 2018.
 18. Acharya T, Devkota R, Bhattarai B, Acharya, R. Outcome of misoprostol and oxytocin in induction of labour. *SAGE open med,* 2017; 5: 2050312117700809.