

**INDUCTION OF LABOR PREVALENCE AND ASSOCIATED FACTORS IN
NEKEMTE REFERRAL HOSPITAL, WEST ETHIOPIA.**

By:

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**A RESEARCH THESIS SUBMITTED TO THE HEALTH RESEARCH AND
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Abstract

Background: Over recent decades, more pregnant women around the world have undergone labor induction to deliver their babies. In developing countries up to 25% of all deliveries at term now involve induction of labor, but in some developing countries the rate are generally lower. Induction is indicated when the benefits to either the mother or the fetus outweigh those of continuing the pregnancy.

Objective: To determine the prevalence of labor induction, together with its factors associated with induction of labor in Nekemte Referral Hospital, west Ethiopia.

Methods: A facility based cross sectional study design was conducted in 2014 G.C to determine the prevalence and associated factors of labor induction on mothers who delivered in Nekemte Hospital from September 1, 2011 to August 30, 2013 G.C. The data on Socio-demographic and obstetric factors was collected from charts of women, log book of the delivery unit and operation theatre registrations, using pretested data collection format by trained data collectors. The collected data was cleaned, edited, and fed to computer to be analyzed using SPSS for window version 16.0.

Results: Majority of study participants were in the age between 20-34 years 540 (89.3%). Among 436 (72%) were term and more than 2/3 were nullparous. Prevalence of induction of labor was 111(18.3%). Post term was the commonest indication for induction of labor 36(32.4%) followed by PROM 32(28.8%). Majority of the induction were successful, 98(88.3%) and the remaining failed 13(11.7%). With regard to maternal and fetal outcome, about 2(1.8%) mothers had complication including uterine rupture and post partum hemorrhage secondary to uterine atone following induction of labor and 11(9.9%) had bad neonatal outcome.

A multivariable logistic regression analysis carried out to isolate the independent effects of the different covariates on induction of labor showed that gestational age and birth weight were more likely associated with induced labor. Mothers with term pregnancy has positive association ($P < 0.001$; AOR 9.937; 95%, 3.390-29.131) and term pregnancy is 9.94 times more likely to be induced than that of preterm and postterm pregnancies, and also it is shown that there is positive association between induced labor and birth weight ($P = 0.001$; AOR 9.107; 95%, 2.343-35.391) and birth weight of (2500-4000grams) neonate are 9.1times delivered form those induced mothers than low birth weight and macrosomia, but Maternal age and parity had no statistical significant association with induced labor.

Conclusion: *Prevalence of induction of labor is (18.3%). Postdate is most common indication for induction of labor. Majority of the induction were successful, 98(88.3%). Out of all induction of labor about 2(1.8%) mothers had complication and 11(9.9%) neonates had bad neonatal outcome.*

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Abbreviations

ARM	Artificial Rupture of the Membranes
BSC	Bachelor of Science
CI	Confidence Interval
CS	Caesarean Section
EFM	Electronic Fetal Monitoring
EL	Evidence Level (level of evidence)
FHR	Fetal Heart Rate
GA	Gestational Age
GDG	Guideline Development Group
IUFD	Intrauterine Fetal Death
ICU	Intensive Care Unit
IV	Intravenous
LSCS	Lower Segment Caesarean Section
MSAF	Meconium Stained Amniotic Fluid
NCC-WCH	National Collaborating Centre for Women's and Children's Health
NHS	National Health Service
NICE	National Institute for Health and Clinical Excellence
NICU	Neonatal Intensive Care Unit
NS	Not Significant
OR	Odds Ratio
PG	Prostaglandin
PE	Preeclampsia
PGE2	Prostaglandin E2
PGF2α	Prostaglandin F2 alpha
RCOG	Royal College of Obstetricians and Gynecologists
RCT	Randomized Controlled Trial
RR	Relative Risk
SD	Standard Deviation
WHO	World Health Organization

CHAPTER ONE: INTRODUCTION

1.1. Background

Induction of labor is defined as iatrogenic stimulation of uterine contractions to cause the delivery of fetus before the onset of spontaneous labor. Labor is typically induced by using one of the following methods: cervical ripening agents, artificial rupture of membranes, and uterine stimulation with oxytocin (1).

Mostly oxytocin has been used alone, or in combination with amniotomy or following cervical ripening with other pharmacological or non-pharmacological methods. It is usually performed by administering oxytocin or prostaglandins to the pregnant woman or by manually rupturing the amniotic membranes. The overall rate of induction of labor is rising faster than the rate of pregnancy complications that would lead to a medically indicated induction. In developed countries, the proportion of infants delivered at term following induction of labor can be as high as one in four deliveries (2-3).

Unpublished data from the WHO Global Survey on Maternal and Perinatal Health, which included 373 health-care facilities in 24 countries and nearly 300 000 deliveries, showed that 9.6% of the deliveries involved labor induction. Overall, the survey found that facilities in African countries tended to have lower rates of induction of labor (lowest: Niger, 1.4%) compared with Asian and Latin American countries (highest: Sri Lanka, 35.5%) (4). In developing countries, up to 25% of all deliveries at term now involve induction of labour. But in some developing countries, the rates are generally lower (5).

Induction of labor is on the rise in the U.S., increasing from 9.5 percent in 1990 to 22.1 percent in 2004. Although, it is not entirely clear what proportion of these inductions are elective (i.e. without a medical indication). However, the maternal and neonatal effects of induction of labor are unclear (6).

1.2. Statement of the problem

Induced labor has an impact on the birth experience of women. It may be less efficient and is generally more painful than spontaneous labor. It is also more likely to require epidural analgesia and assisted birth. Induction of labor is a relatively common procedure. In 2004-05, 19.8% of all deliveries in the UK were induced; this includes induction for all reasons. Among those labor induced by drugs, whether or not surgical induction was attempted, less than two-thirds of women gave birth without further intervention, with about 15% having instrumental births and 22% having emergency caesarean sections (7).

Induction of labor is directly relevant to the health related millennium development goals (MDGs). It has potentials for preventing maternal complications and improving pregnancy outcome. Beyond 41 weeks gestation, the number of routine induction of labor needed to prevent fetal or neonatal death decreases constantly (8). An increased rate of induction of labor for post-term pregnancies over a 15-year period was associated with decreased stillbirth rates in Canada (9).

Africa has the highest maternal and perinatal morbidity and mortality rate (10, 11). Ethiopia is also one of the less developed African countries where maternal and perinatal morbidity and mortality rates are still very high. Its maternal mortality ratio is one of the highest in sub-Saharan African, 676/100,000 live births according to 2011 DHS Data

and the perinatal mortality is also high Efforts aimed at achieving the health related MDGs should focus on increasing access to effective interventions and on improving quality of health care (10).

Analysis of the African data set in the WHO Global Maternal and Perinatal Health Survey of 2004 – 2005 to assess practice of induction of labor with in African countries and its implications for maternal and newborn health. Specifically, with the aim to determine the proportion of pregnant women who could benefit from the intervention but did not receive it and also compare pregnancy outcomes for women who had induction of labor and those who were eligible but missed the opportunity. The problem was low rate of induction was present in Africa, even though rates of induction of labor were variable from country to country, 1.4% in Niger and 6.8% in Algeria, in Africa truly have the lowest rates of induction of labor (12-13).

Induction of labor can reduce the emotional burden on the patient associated with carrying a dead fetus, the slight possibility of chorioamnionitis, and the 10% risk of disseminated intravascular coagulation when a dead fetus is retained for more than 5 weeks in the 2nd or 3rd trimester. The management of induction of labour in women with IUFD and a favorable cervix is often uncomplicated. Women should receive appropriate psychological support from healthcare professional (14).

Different studies conducted elsewhere have identified the prevalence and associated factors of induction of labor including its outcomes. But in my study area, according to the hospital annual report there were no formal studies done toward labor inductions. And also in area with a high rate of maternal mortality and morbidity due to poor access to comprehensive emergency obstetric care (CEMOC) knowing the prevalence, indications

and pregnancy outcome following inductions of labor is crucial. Therefore this study is aimed at providing information on prevalence, associated factors and outcomes of inductions of labor in Nekemte referral Hospital which helps to reduce the rate of maternal mortality and morbidity resulting from complications related with pregnancies that need emergency terminations of pregnancy. As a result information's on this issue will help the hospital staff to know the protocol, trends, common indications, prevalence's and outcomes as well as the administrative bodies to prioritize their resource distribution on the most common priority areas. The study result will help other stakeholders (NGOs) working in this line. It may also help for other researchers, zonal health departments, Oromia regional health bureau and the country at large.

1.3. Significance of study

In general maternal & neonatal morbidity and mortality in developing countries especially in Sub-Saharan country are very high. Ethiopia as a member of sub Saharan African country contributes a huge number in maternal & neonatal morbidity and mortality; to reduce this and to achieve the millennium development goal the country works hard in a multi directional way, this includes the accessibility of compressive obstetric care in health institutions, in doing so induction of labor should be performed in those health institutions for scientific reason based on the WHO recommendation, additionally induction of labor should improve and contribute in the reduction maternal & neonatal morbidity and mortality of the hospital as well as the country. Hospitals should have base line study on prevalence and factors associated with induction of labor in order to assess the progress through time for further study and intervention. Even though some studies have been carried out on prevalence and factors associated with

induction of labor. But there is no report in Nekemte referral Hospital recently. This study explores prevalence and factors associated with induction of labor in Nekemte referral Hospital. So the significance of this study is too made relevant recommendations on induction of labor based on the result of study and provide base line data for further study

CHAPTER TWO: LITERATURE REVIEW

The global prevalence rate of induction of labor was 16%. Vaginal delivery was achieved in 472 (84%) women. The most common indications for induction of labor were post-term pregnancy in 174 (31%), and diabetes mellitus in 131 (23.2%) of the participants. Maternal characteristics associated with risk of CS were null parity (odds ratio: 1.58; 95% confidence interval: 1.09-2.320; $p=0.01$), Neonates of women with successful induction of labor had significantly higher APGAR scores ($p=0.04$). There was no difference in the rate of post-partum hemorrhage, CS or ruptured uterus between the women who had induction of labor and those who went in to spontaneous labor (15).

Rates of induction of labor vary from region to region. In the United States of America and United Kingdom about 20% of all deliveries had induction of labor (16, 17, 18) while 11.4% was reported for Latin America (19). A study done in 120 large Latin America Hospitals' including (Cuba, Peru, Mexico, Ecuador, Argentina and Brazil) shows that, the prevalence of induced labour was 11.4%. This is lower than that reported for developed countries, which is around 20% (20). The rate ranged from 5.1% in Peru to 20.1% in Cuba. The main indications were premature rupture of membranes (25.3%) and elective induction (28.9%). The success rate of vaginal delivery was very similar for oxytocin (69.9%) and misoprostol (74.8%), with an overall success rate of 70.4%. Induced labour was more common in women over 35 years of age. The rates of labor induction are low in the Africa. Only 3% of women had induction of labor in a specialist unit in Nigeria (21).

The commonest medical indication for labor induction in six Latin American countries (Cuba, Peru, Mexico, Ecuador, Argentina and Brazil) and Africa studied were premature

rupture of membranes, while a study carried out in the United States shows pre-eclampsia and postdates pregnancies were the most common indications followed by premature rupture of membranes in third place. However, in France, the most common indication was post-dates pregnancy followed by ruptured membranes (13, 22).

As study shows women who underwent membrane sweeping were significantly less likely to require formal induction of labor (RR 0.51, 95% CI 0.37 to 0.71; three RCTs, 226 women). And also there were no significant differences in caesarean birth rate (RR 0.98, 95% CI 0.49 to 1.95; three RCTs, 200 women), epidural anesthesia usage (RR 0.70, 95% CI 0.42 to 1.18; one RCT, 65 women), instrumental vaginal birth rate (RR 0.87, 95% CI 0.33 to 2.24; two RCTs, 135 women), 5 minute Apgar score < 7 (RR 0.97, 95% CI 0.06 to 4.85; one RCT, 65 women) or neonatal ICU admissions (RR 0.97, 95% CI 0.15 to 6.47; one RCT, 65 women) maternal and/or prenatal mortality between membrane sweeping and did not (23).

The overall success rate for vaginal delivery following labor induction was 70% but this rate varies little in accordance with the country or the method used. Although this rate is still lower than the 83% success rate reported from other regions (22, 24). However, it is known that unfavorable cervix reduces the success rate of induction of labor (22). And also studies of women with an unfavorable cervix and intact membranes reported that intravenous oxytocin alone was significantly associated with an unchanged cervical status after 12–24 hours (RR 2.67, 95% CI 1.21 to 5.88 (25). Null parity and age over 35 years were risk factors for labor induction (23).

In contrary, the study done by Mac Dorman et al. which analyzed 10 years labor induction rate and associated risk factors in the United States found no effect of age on the prevalence of induction (26).

The induction rates in Africa are about one-fifth to a quarter of the rates for lower than developed regions; and also its perinatal mortality rate is 7 – 8 folding higher (27). In Democratic Republic Congo (DRC), Algeria, Kenya, Nigeria, Niger and Uganda were most inductions were performed between 37 and 41 weeks of gestation. However, in Angola, there was an even distribution of induction of labor between 34 – 36 weeks (44.8%) and 37 – 41 weeks (44.0%) (13). These low rates of induction of labor in Africa closely reflect the very high perinatal mortality rate of 56 per 1000 live births for the region according to WHO estimates; the highest of all the world regions.

Induction of labor with the goal of achieving vaginal delivery prior to spontaneous onset of labor is recommended when the benefits of delivery outweigh the risks of continuing the pregnancy, while (27 Intrauterine fetal death) accounting for almost 7% of all induced labor in the African obstetric population represented avoidable perinatal losses. The equivalent figure in Latin America is only 2.8% (28).

One systematic review (22 RCTs involving 2797 women, Bishop score ranged from ‘closed’ to 6 or less, mixed parity) compared sweeping of membranes with no treatment (20 RCTs) and compared membrane sweeping with prostaglandins (3 RCTs) and oxytocin (one RCT). Two studies reported more than one comparison. Women at 37–40 weeks and those at 40 weeks or more of gestation were included in 16 studies and six studies, respectively. Unfavorable cervix (as defined by trial lists) was reported in seven studies.

The interventions included weekly membrane sweeping (seven RCTs), sweeping every 3 days (one RCT) and daily sweeping (two RCTs). The control groups received cervical assessment or gentle vaginal examination (29).

Induction of labor has also been shown to improve maternal outcomes. Koopmans et al. demonstrated 29% reduction in poor maternal outcome among women with gestational hypertension or pre-eclampsia who had induction of labor compared with expectant management. In this study, proxies for poor maternal outcome namely hysterectomy or maternal death were not significantly different for women who had an induction compared with those who did not. The rate of labor induction in the United States continues to rise significantly for all gestational ages. Final data for the year 2003 from the National Center for Health Statistics indicated that the rate was 20.6% for the year 2002, more than twice the 1989 level of 9% (30).

Nulliparous women with a Bishop score no more than 3 have a 23-fold increased risk of induction failure and a two to four fold increased risk of cesarean delivery compared with nulliparous women with a Bishop score of at least 4 (34). Similarly, multiparous women with a Bishop score of no more than 3 have a six fold increased risk of failed induction and two fold increased risk of cesarean birth compared with women with higher Bishop scores(31,32).

Uterine rupture is an uncommon complication when oxytocin is used appropriately. No prospective data in the literature describe the incidence of uterine rupture in oxytocin-induced labor. Retrospective series of uterine rupture have implicated oxytocin in 4.3% (33) to 12.5% (34) of occurrences.

In Sir Lanka University Obstetric Unit the rate of induction of labor was 8.5% in 2006. The leading indications for induction of labor were post dates (45.8% in 2003 and 45% in 2006) and pre labor rupture of membranes (28.2% in 2003 and 35.4% in 2006). Successful vaginal deliveries showed a possible increase from 84.7% in 2003 to 90.4% in 2006 and failed inductions showed a possible reduction from 3.8% in 2003 to 2.2% in 2006 (35).

CHAPTER THREE: OBJECTIVES

3.1 General objective

- ✓ To determine the prevalence of labor induction and factors associated with induction of labor in Nekemte Referral Hospital from September 1, 2011-August 30, 2013 G.C.

3.2 Specific objectives

- ✓ To determine the prevalence of labor induction in Nekemte Referral Hospital from September 1, 2011-August 30, 2013 G.C.
- ✓ To determine the success of labor induction in Nekemte Referral Hospital from September 1, 2011-August 30, 2013 G.C.
- ✓ To identify factors associated with induction of labor in Nekemte Referral Hospital from September 1, 2011-August 30, 2013 G.C.
- ✓ To determine induction related complications and outcome in Nekemte Referral Hospital from September 1, 2011-August 30, 2013 G.C.

CHAPTER FOUR: MATERIALS AND METHODS

4.1. Study area and period

The study was conducted in Nekemte referral hospital from September 1, 2014-August 30, 2014 G.C on mothers who gave birth in NRH from September 1, 2011-August 30, 2013 G.C. Nekemte referral Hospital is located in Nekemte town, East Wollega Zone of Oromia regional state, Ethiopia at a distance of 331km from Addis Ababa to the west. The total catchment population of the hospital is about 2.1 million peoples of Nekemte town, East wollega zone, parts of west wollega zone, Horoguduru zone and west shoa zone. Currently, Nekemte referral hospital provides both outpatient and inpatient services. The hospital has 178 beds used for the inpatient services, among these 33 beds for obstetrics and gynecology ward and also has 4 delivery couches.

In the hospital there are 113 health professionals and 78 administrative staffs workers.

The Hospital provides Medical treatment, ophthalmic treatment, Psychiatric treatment, major and minor operation, inpatient services, MCH, control of HIV, laboratory, X-ray and ultrasound, drug and pharmacy, training services, physiotherapy, HMIS department of the hospital and MDR Tb treatment. Gyn.Obs is one of the departments where laboring mothers were admitted, followed and managed accordingly.

4.2. Study design

A facility based cross sectional study was conducted to describe the prevalence of labor induction, together with its factors associated with induction of labor.

4.3. Source population

All pregnant women who gave birth after 28 weeks of gestation in the Nekemte Referral Hospital.

4.4 Study population

All pregnant women who were induced and gave birth after 28 weeks of gestation in the Nekemte Referral Hospital.

4.4. Inclusion and Exclusion criteria

4.4.1. Inclusion criteria

Mothers who gave birth after 28 weeks of gestation, singleton and vertex presentation in Nekemte Referral Hospital

4.4.2. Exclusion criteria

Multiple pregnancies and non-vertex presentation.

4.5. Sample size determination and sampling technique:

4.5.1 Sample size

The sample size of this study was 605 charts of mothers who gave birth in NRH during the study period, which was calculated by using Cochran's sample size formula

$$\mathbf{n} = \frac{\mathbf{Z}^2\mathbf{P}(1-\mathbf{P})}{\mathbf{e}^2}$$

$$\mathbf{Z} = 1.96$$

$$\mathbf{P} = 0.068$$

$$\mathbf{E} = 0.02$$

Where, **n** is the sample size, **Z²** tabulated value from standard normal distribution with the desired confidence level (95%), **e** is the desired level of precision; **P** is the estimated proportion (6.8 %) (13) of an attribute that is present in the population (36).

4.5.2 Sampling technique

Based on the information obtained from the hospital delivery registration log books, a total of 5,940 mothers were gave birth in NRH during the study period. From this 605 study unit was taken by using a systematic sampling method. The interval between selected elements from the list was calculated by dividing the delivery attendees to the total sample size that was $5940/605= 10$. The starting point was a number between 1 and 10 that was selected randomly, which was 5. After that a sampling frame was made from labor registration log books of NRH for 5940 mothers who delivered in NRH from September 1, 2011-August 30, 2013 G.C.

4.6. Study variables

4.6.1. Dependent variables

The dependent variable of this study is induction of labor.

4.6.2. Independent variables

Age, place of residence, ANC follow up, Uterine contraction, parity, gestational age, bishop score, ripening agent, cervical dilation, method of induction and membrane status taken as independent variable.

4.7. Data collection method & tools

Using the labor ward delivery logbook that gave birth from September 1, 2011-August 30, 2013 G.C, and 605 study units was obtained by systematic sampling. Data was collected using structured check list. The check list was prepared in English and data was collected from medical record books. One Bsc nurse supervisor and four diploma clinical nurse data collectors were participated in the data collection process. One day intensive training was given to the data collectors and supervisor.

The data collection was underwent from November 1-December 30/2014 G.C.

4.8. Quality control

The questionnaire was pre-tested on pilot sample of the total study that gave birth during study period. Possible amendments were made to ensure their accuracy and consistency prior to actual collection of data. Data collectors was trained for four days on objective of the study, how to gather the appropriate information, procedures of data collection techniques and the whole contents and subject matter of the questionnaire. Day to day supervision was carried out during the whole period of data collection by the supervisor. At the end of each day, the questionnaire was reviewed and cross checked for completeness, accuracy and consistency by the investigator and corrective discussion was under taken with all the data collectors. Data was cleaned and edited after it is entered in to the SPSS version 16.0 computer program software.

4.9. Data analysis

Data was first checked manually for completeness then coded and entered using epi data before exported to SPSS version 16.0 for analysis. Some of variables were categorized for analysis purpose. Then, frequency distributions of both dependent and independent variables were done and chi-squared test was used to determine the association between independent and dependent variables. Frequency tables and graphs and also bivariate analysis also were conducted using percentages crude odds ratios and 95% CI. Multivariable analysis was also done to control for possible confounding variables and to identify possible predictors of induction of labor. All Variables with p-value <0.25 at bivariate was entered into multivariable logistic regression and all variables with p-value <0.05 was declared predictors of induction of labor and was considered statistical significance association on multivariable regression model.

4.10. Dissemination of the finding

The result of the study will be submitted to the collage of public health and medical science of Jimma University, Nekemte referral hospital and other responsible bodies. The result will be presented during thesis defense in the collage of public health and in different seminars, meeting, conferences and workshops. Moreover, efforts will be done to publish the findings of the study and to disseminate through different journals and scientific publications.

4.11. Operational definition

Apgar score: A scoring system devised by Dr Virginia Apgar (1909–74) based on five criteria (heart rate, respiration, color, muscle tone and response to stimulation) and used as a marker of a newborn baby's need for resuscitation at birth. A score of 0, 1 or 2 is awarded for each criterion, with a total score out of ten. The score is assessed at 1 and 5 minutes after birth.

Bishop score: A group of measurements made at internal examination, 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.

Failed induction: is diagnosed when there has been no cervical change or descent of the presenting part after 6-8 hours of labor, or contraction of 3 in 10 min. has not been achieved.

Induction agent: A substance used to initiate labor.

Induction of labor: The artificial initiation of labor.

Parity: The number of times a woman has given viable birth. A woman who has given birth a particular number of times is referred to as Para 1, Para 2, etc.

Premature/Pre-labor rupture of membranes: is rupture of membranes (ROM) before the onset of labor (regular uterine contractions).

Place of residence: those mothers only from Nekemte town, gimbo town and dambidolo town taken as mother from urban area.

Bad neonatal outcome: neonatal outcome with complication like stillbirth and early neonatal death

4.12. Ethical consideration

Ethical clearance was obtained from ethical review committee of Jimma University, College of public health and medical sciences and official letter of co-operation was given to Nekemte referral hospital. Confidentiality has been kept for relevant information taken from the hospital medical records. Charts and medical records of patients were revised only for the purpose of interest of the study. Information about the study has been told to the departments of hospital, labor and delivery, maternity ward, Operating Room (OR) and card office.

CHAPTER FIVE: RESULTS

During the three years study period (from September 1, 2011-August 30, 2013 G.C) there were a total number of 5,940 deliveries were conducted in Nekemte referral hospital, of which 605 women records were included in the study.

5.1 The socio-demographic and obstetric characteristics.

Majority of the mothers present are in age between 20-34 years 540 (89.3%). Most of the study participants 367(60.7%) were living in rural area. Among 436 (72%) were term pregnancy and 49 (8.1%) were post term. And most of the study subjects 497(82.1%) had ANC follow-up and 95(15.7%) had no ANC follow up. Thirty six point five percent of mothers were nulliparous. And 207(34.4%) the study participants were primigravida ladies (as shown at Table 1 and Table 2).

Table 1: Distribution of study participants by selected socio demographic characteristics in Nekemte Referral Hospital, west Ethiopia, from September 1, 2011-August 30, 2013 G.C.

Variable	Classification	No	%
Age	≤19 yrs	26	4.3
	20-34yrs	540	89.3
	≥35yrs	39	6.4
Place of residence	Urban	238	39.3
	rural	367	60.7

Table 2: Distribution of study participants by selected obstetric characteristics in Nekemte Referral Hospital, west Ethiopia, from September 1, 2011-August 30, 2013 G.C.

Variable	Classifications	no	%
GA	Preterm	36	5.95
	Term	436	72
	Post term	49	8.1
	Unknown LNMP	84	13.9
ANC follow up	Yes	497	82.1
	No	95	15.7
	Unrecorded	13	2.1
Gravidity	GI	207	34.4
	GII	164	27.1
	GIII	110	18.1
	GIV	45	7.4
	GV+	79	13.1
Parity	PI	159	26.3
	PII	112	18.5
	PIII	38	6.2
	PIV+	75	12.4

5.2 Prevalence of induction of labor.

The prevalence of induction of labor in Nekemte referral Hospital was 111(18.3%). Most of the induced mothers were in the age group 20-34years. According to this study majority of the mothers who were induced (64.9%) were from urban area. Moreover,

Residence area of the mothers (urban/rural) was found to have no statistically significant association (P= 0.335; AOR 0.810; 95%, 0.527-1.244) with the induction of labor. Fifth two point three percent of the mothers who were induced during the study period were nulliparous. But there was no statistically significant association between parity of the mothers and induction of labor. Eight nine point two percent of the 111 mothers with induction of labor had ANC visit during the index pregnancy. Induction of labor was found to be more common in mothers who had ANC visits during the current pregnancy. Majority of labor inductions 58(52.3%) was at term (as shown at Table 3).

Table 3: Distribution of study participants by onset of labor in Nekemte Referral Hospital, west Ethiopia, from September 1, 2011-August 30, 2013 G.C.

Variable		No	%
Onset of labor	Spontaneous	494	81.7
	Induced	111	18.3
	Total	605	100

5.3 Indications of labor inductions

Post term pregnancy was the most common indication for induction of labor accounting for 36(32.4%) of the cases followed by PROM which contributed for 32(28.8%), and the rest are 19(17.2%), 16(14.4%) and 6(5.4%) of the labor inductions were contributed by sever preeclampsia, eclapmsia and intrauterine fetal death (IUFD) respectively (fig.1).

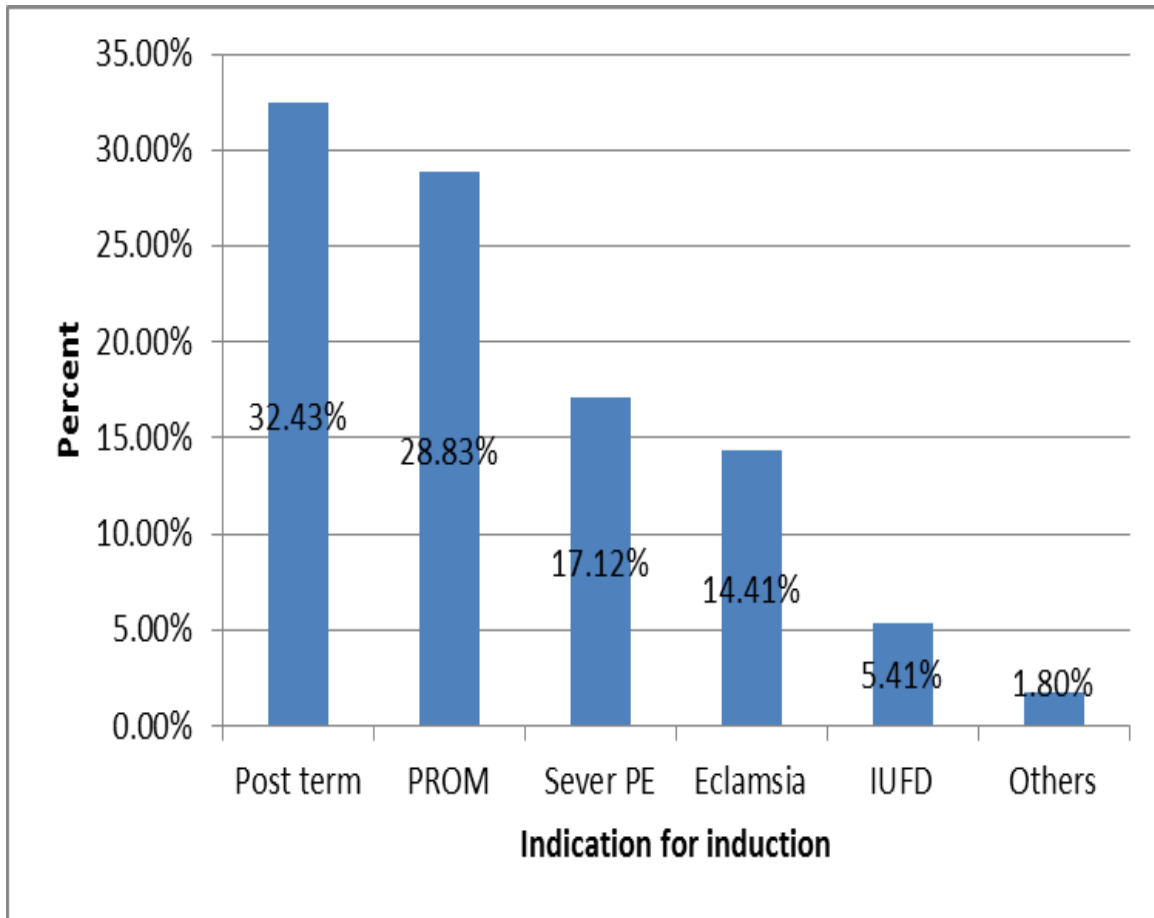


Figure 1: Distribution of study participants who underwent induction of labor by indications for induction in Nekemte Referral Hospital, west Ethiopia, from September 1, 2011-August 30, 2013 G.C.

From a total of 111 labor inductions eighth eight point three percent of labor inductions were successful and the remaining was failed. From failed induction most of the cases 10(76.9%) were with unfavorable cervix before induction of labor, however, for only two of them ripening of cervix was done. Fifth seven point one percent of unfavorable cervix with no cervical repining was failed (table.3).

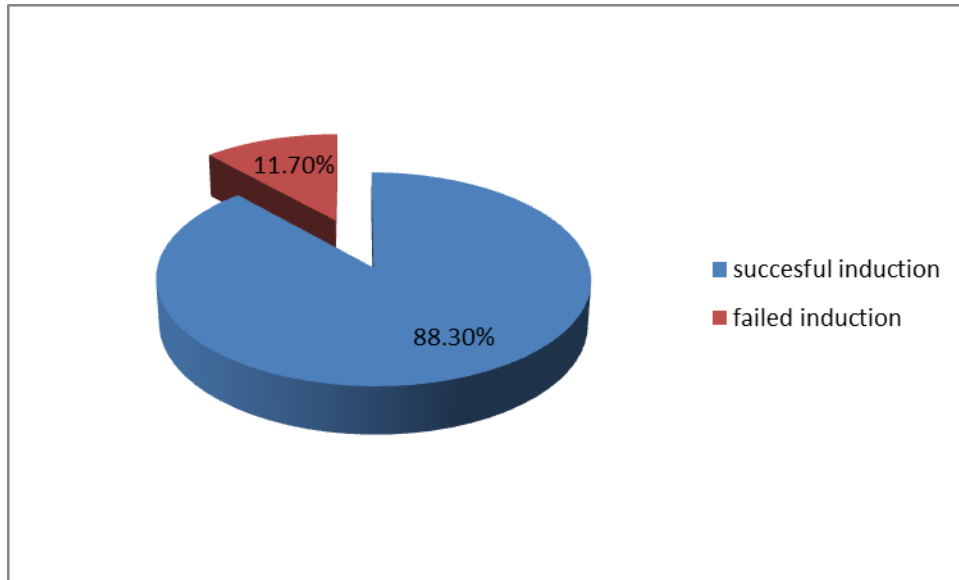


Figure 2: Distribution of study participants by failed induction in Nekemte Referral Hospital, west Ethiopia, from September 1, 2011-August 30, 2013 G.C.

5.4 Maternal and neonatal outcome

Regarding the maternal and neonatal outcome, out of all induction of labor about 2(1.8%) mothers had complications including uterine rupture and post partum hemorrhage secondary to uterine atone following induction of labor and 11(9.9%) neonates had bad neonatal outcome. Eight four point seven percent of neonates have Apgar score ≥ 7 and the remaining fifteen point three percent had a score less than seven. Majority of the neonates with bad outcome 7(63.6%) were stillbirths while 2(18.2%) died within 7 days after birth. Most 6(85.7 %) of still births were born from those who had ANC follow up. The birth weight of 90(81.1%) the new born was in the normal range (2500-3999gms), were as 8(7.2%) of them were macrosomic (>4000gms) & the other 13(11.7%) had low birth weight (<2500gms). Majority of still births weight were low birth weight and very low birth weight (71.4%).

5.5 Factors associated with induction of labor.

A binary logistic regression was done to show the association between induced labor and obstetric condition. Among obstetric condition, both the crude & adjusted analysis show that gestational age and birth weight were statistically significant association with induced labor. Mothers with term pregnancy has significant association ($P < 0.001$; AOR 9.937; 95%, 3.390-29.131) as compared with preterm that shows term pregnancy is 9.94 times more likely to be induced than that of preterm, and also it is shown that there is significant association between induced labor and birth weight ($P = 0.001$; AOR 9.107; 95%, 2.343-35.391) and birth weight (2500-4000grams) as compared with preterm neonate that shows birth weight (2500-4000grams) neonates are 9.1times delivered form those induction of labor than low birth weight. Maternal age and parity had no statistical significant association with induced labor (as shown at Table 4).

Table 4: Binary logistic regressions for factors associated with induced labor in Nekemte Referral Hospital, west Ethiopia, from September 1, 2011-August 30, 2013 G.C.

Variables	spontaneous labor No. (%)	Induced labor No. (%)	P- Value	Cured OR(95% CI)	P- Value	Adjusted OR(95% CI)
Maternal age						
≤19	15(3)	11(9.9)				
20-34	448(90.7)	92(82.9)	0.063	2.842(0.946-8.535)	0.161	2.523(0.691-9.295)
+35	31(6.3)	8(7.2)	0.580	0.796(0.354-1.787)	0.552	0.748(0.287-1.948)
ANC follow up						
Yes	417(84.4)	80(89.2)	0.068	0.269(0.083-9.867)	0.168	3.723 (1.153-12.024)
No	69(14)	26(23.4)	0.298	0.520(0.152-1.784)	0.298	1.923 (0.561- 6.597)
Unrecorded	8(1.6)	5(4.5)				
GA						
Preterm	24(4.8)	12(10.8)				
Term	378(76.5)	58(52.3)	0.002	3.752(1.115-3.618)	0.000	9.937(3.390-29.131)**
Posterm	13(2.6)	36(32.4)	0.000	1.135(1.045-2.148)	0.000	1.071(1.038-8.133)
Parity						
P0	163(33)	58(52.3)	0.423	1.290(0.692-2.407)	0.929	1.036(0.481-2.230)
PI	138(27.9)	21(18.9)	0.138	0.582(0.285-1.190)	0.126	0.517(0.222-1.204)
PII	98(19.8)	14(12.6)	0.309	0.664(0.302-1.461)	0.275	0.600(0.240-1.502)
PIII	36(7.3)	2(1.8)	0.096	0.272(0.059-1.260)	0.131	0.282(0.055-1.459)
PIV+	59(11.9)	16(14.4)				
Wt in gram						
<2500	23(4.7)	13.5(5.4)				
2500-4000	424(85.8)	90(81.1)	0.003	5.109(1.752-14.895)	0.001	9.107(2.343-35.391)**
>4000	47(9.5)	6(13.5)	0.257	1.663(0.690-4.007)	0.169	2.091(0.731-5.979)

CHAPTER SIX: DISCUSSION

Induction of labor is an obstetric intervention usually employed to prevent adverse pregnancy outcomes. Induction rate of 18.3% from this study confirms that the labor induction rate was almost near to three times higher with finding in Algeria (6.8%) and Peru (5.1%) (16, 17, 18) but other finding in Cuba 20.1 % (19) and United Kingdom 20 % (20, 21) shows higher figure than the findings of this study.

In this study the main indications for induction of labor were post term pregnancies 36(32.4%) followed by PROM 32(28.8%). Findings of this study is almost similar with study done in France, the most common indication were post-dates pregnancy followed by ruptured membrane (21). And also in Sri Lanka the leading indications for induction of labor were post dates (45.8% in 2003 and 45% in 2006) and pre labor rupture of membranes (28.2% in 2003 and 35.4% in 2006) (35). Whereas, in Africa and Latin American the main indications for induction of labor was premature rupture of membranes; moreover, in the United States pre-eclampsia and postdates pregnancies were the most common indications followed by premature rupture of membranes in third place (13, 23).

When we see the gestational age with performed labor inductions in this study 12(10.8%) of the induced labor was preterm pregnancy, 58(52.3.2%) and 36(32.3%) were term pregnancy and post term pregnancy respectively and more than half induction was performed at term pregnancy this is statistically significant, from the total 111 labor inductions fifth five point two percent of induction was done at term pregnancy has positive associated ($P < 0.001$; AOR 9.937; 95%, 3.390-29.131) and 9.94 times more likely to be induced than that of postterm and preterm. The findings of this study has

similar figure with study done in some Africa country like Democratic Republic Congo (DRC), Algeria, Kenya, Nigeria, Niger and Uganda were most labor inductions performed in between 37 and 41 weeks of gestation. However, in Angola, there was an even distribution of induction of labor between 34 – 36 weeks (44.8%) and 37 – 41 weeks (44.0%) (28).

In this study 58(52.3%) of labor inductions was done in prim gravid ladies these is high proportion to other parity. But, it has no significant association with induction of labor. As the study shows prim gravidity were risk factors for labor induction (23).

In this study the majority of labor inductions were successful 98/111(88.3%) and the remaining was failed 13(11.7%). When we see the cervical status, mothers with favorable cervical status about 3(21.3%) was failed induction, however, in mothers with unfavorable cervical status the rate of failed induction increases with more than three folds than mothers with favorable cervical status 10(76.9%). These findings had the same conclusion with the study done by Lydon Rochelle, labor induction when the cervix is unfavorable, it increase the rate of failed induction (25).

When we see about cervical status in this study those mothers with unfavorable cervical status and cervical ripening was done and only 2(20%) failed. And those mothers with unfavorable cervical status and cervical ripening was not done 8(57.1%) was failed induction. So from this study cervical ripening is most important tool for success of induction of labor. Findings of this study has similar outcome as compared to Poma PA and Xenakis EMJ (32, 33).

The study also showed that, out of all induced mothers about 2(1.8%) mothers had complication including uterine rupture and post partum hemorrhage secondary to uterine

atone following induction of labor. Findings of this study, showed low rate of bad maternal outcome compared with two retrospective series studies with 4.3% to 12.5% uterine rupture have implicated (33, 34).

Regarding unfavorable neonatal outcome 11(9.9%) neonates had bad neonatal outcome, including still birth and early neonatal death. And bad neonatal outcome occurrences have almost similar figure with African perinatal losses 7% but it is still high as compared with figure in Latin America is only 2.8% perinatal losses and 4.6% in DHS result of 2011(28).

Strength of the Study

- As to my knowledge this research is the first research performed in the hospital to this area of interest

Limitations of the study

- The outcome of the study was measured from data that was obtained from secondary data sources. Due to these, missing values were common, and these might have affected the true result of the research.
- As any cross-sectional study, it does not show the temporal relation between the outcomes and factors affecting them.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION

7.1 Conclusion

- This study conducted to determine the prevalence and factors associated with induction of labor in Nekemte Referral Hospital. The results have shown that,
 - ☞ The prevalence of induction of labor is (18.3%).
 - ☞ Postdate pregnancy is the most common indication for induction of labor.
 - ☞ Majority of labor inductions were successful 98/111(88.3%).
 - ☞ Out of all induction of labor about 2(1.8%) mothers had complication and 11(9.9%) neonates had bad neonatal outcome.

7.2. Recommendation

- Based on the findings of this study, the following recommendations were given to Nekemte referral hospital, relevant governmental bodies, NGOs and other responsible bodies.
 - ☞ Since majority of labor inductions were success, those mothers who were eligible for induction of labor should be encouraged before complication happened.
 - ☞ The rate of failed induction due to unfavorable cervical status is high, but unfavorable cervix with cervical ripening was shows high success of induction. Therefore, ripening of the cervix with unfavorable bishop score should be considered prior to induction of labor.
 - ☞ Early diagnosis and immediate action should be emphasized by all health care providers at all level to reduce the rate of preventable perinatal losses.
 - ☞ Further research is needed to identify the hospital based magnitude of induction labor.

ANNEX 1

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ANNEX 2

Checklist

Thesis to assess the prevalence and associated factors of induction of labor in Nekemte referral hospital, west Ethiopia. Three years (September 1, 2011- August 30, 2013 G.C.) retrospective cross sectional study.

Part I: Socio demographic & obstetric characteristics of the client

1. Code no_____?
2. Age (yrs)_____?
3. Place of residence a)urban b) rural
4. ANC follow up a) yes b) No c) un-recorded
5. Gravidity_____?

Part II: Predictors for maternal & per natal out come in Induction of labour

6. Parity_____?
7. Gestational Age in weeks (for those with known LMP or early U/S) _____?
8. Onset of labor a) spontaneous b) induced
9. Bishop score before induction_____?
10. Was cervical ripening done a) Yes b)No
11. If yes to Q number 8, what was the agent used_____?
12. What were the total doses of the ripening agent used_____?

Part III: For induction labour

13. What was Indication for induction of labor_____?
14. If the membrane was ruptured before induction of labor, how was the Status of amniotic fluid a) Clear b) Grade-I MSAF b) Grade-II MSAF c) Grade-III MSAF

15. If the membrane was ruptured, what was the duration of PROM in hour's _____?
16. What was the Method of induction _____?
17. What was the total duration of induction in hours for failed induction _____?
18. Total duration of induction in hours for successful induction _____?
19. Mode of delivery _____?
20. If OVD for Q number 19, what was the indication _____?
21. If C/s for Q number 19, what was the indication _____?
22. If fetus/neonate dead, when a) ante partum b) intra partum c) early neonatal death
23. Fetal weight in grams _____?
24. Apgar score a) in the first minute _____? b) In the fifth minutes _____?
25. Resuscitation done a) yes b) No
26. Admission to neonatal unit a) Yes b) No
27. Duration of hospital stay (days) _____?
28. Maternal complications (specify) _____?
29. Maternal condition at discharge _____?
30. Neonatal condition a) Normal b) improved and Discharged c) Dead d) Unknown e) Others _____?