Determinants of failed oxytocin induction among women who gave birth at referral hospitals of Amhara region, Ethiopia, 2018: A case control study

Abenezer Melkie (✉ mamushmelkie@gmail.com)

Debre Tabor University

Mesafint Ewunetu

Bahir Dar University

Simegnew Asmer

Bahir Dar University

Maru Mekie

Debre Tabor University

Enyew Dagnew

Debre Tabor University

Research note

Abstract

Abstract Objective: This study was aimed to identify determinants of failed oxytocin induction among women who gave birth at referral hospitals of Amhara Region, Ethiopia. Unmatched case control study design was employed among 336 women who had oxytocin induction with 2:1 control to case ratio. Results: A total of 336 women were participated in the study giving a response rate of 100% for both cases and controls. The odds of having failed induction were found to be 11.77 times higher among women who had intermediate bishop (AOR=11.77(5.19, 26.71)) compared with counterparts. Likewise, the odds of having failed induction were found to be higher (AOR=6.24, 95%, CI: (3.32, 11.73)), (AOR=2.47, 95%, CI: (1.31, 4.68)), and (AOR=2.16, 95%, CI :(1.13, 4.16)) among women who are primiparous, those who had emergency oxytocin induction, and women with age ≤30 years respectively. Cervical status shall be seen with care prior to oxytocin induction and repining shall be considered to have better outcome. Keywords: Induction of labor, failed induction, Bishop score, Ethiopia

Introduction

Failed induction of labor is one of the commonest indication for operative deliveries which in turn results subsequent compilation related to the surgical procedures (1). Induction is an artificial initiation of uterine contractions before the onset of spontaneous labor by using utero tonic drugs and other methods (2). Induction of labor can be conducted for different indications such as obstetric indications, medical indications and elective or social indications in which obstetrics indication is the commonest one (3). Induction of labor is used as obstetrical intervention when a pregnancy accompanied by complications such as pregnancy induced hypertension, chorio-aminionitis, intrauterine fetal death (IUFD), polyhydramnios, and post term pregnancy (4).

Induction of labor is recommended when the benefits of delivery out-weigh the risk of continuing the pregnancy (5). Evidences showed that failed induction of labor increased rates of operative vaginal deliveries ,caesarean sections (C/S) and complication associated with it(1) . Known risk factors for failed induction are null parity, diabetes, and hypertension (6). Length of time since initiation of induction is also a risk factor for operative delivery in induction (7). Age of the women is also found to be predictor of failed induction. Women with ages of above 35 years were more likely to face failed induction compared with counterparts(8) . Conversely, a study conducted in King Khalid University Hospital, Kingdom of Saudi Arabia disclosed that there was no significant association between maternal age and failed induction of labor (9).

Ethiopia is one of the countries with high maternal and perinatal mortality (10). In area with a high rate of maternal and perinatal mortality due to poor access to comprehensive emergency obstetric care; identifying determinant of failed oxytocin induction is mandatory. To the knowledge of the authors, there is paucity of studies exploring determinants of failed induction in Ethiopia particularly the study area. Therefore, this study aims to identify determinant for failed oxytocin induction at referral hospitals of Amhara region.

Methods

A facility based unmatched case control study was conducted at five referral hospitals in Amhara region, Ethiopia from March 19 to May 18, 2018. The study was conducted in Felege Hiwot Referral Hospital (FHRH), University of Gondar Referral Hospital (UoGRH), Debre Markos Referral Hospital (DMRH), Dessie Referral Hospital (DRH), and Debre Birhan Referral Hospital (DBRH). The study participants were women who delivered by oxytocin induction of labor in the selected five referral hospitals.

Double population proportion formula was used to calculate sample size at 95% confidence level, 80% power, and a 2:1 control to case ratio. The final sample size after adding 10 % none response rate was 336 (112 cases, 224 controls). Proportions among cases and controls were taken in a study conducted in Jimma University hospital(11). The calculated sample size of 336 was proportionally allocated for each health facility based on the oxytocin induction report of the last three months. In this regard FHRH= 72, UoGRH=87, DMRH=69, DRH=54, and DBRH=54 samples were allocated to hospitals. Since labor induction is a rare event, consecutive sampling technique was employed to select cases and controls among mothers who had oxytocin induction.

Data collection was performed through interview of women who had oxytocin induction and review of medical record to cross check the quality of data obtained by interview and to confirm diagnosis using pretested structured questionnaire and abstraction checklist. Questionnaire was used to assess socio demography factors, obstetric factors, institutional factors, and health indication for labour induction. The questionnaire used for this study was adapted from different studies (6, 9, 11) (additional file 1).

Then data was entered in a template prepared in Epi-info version 7 software. Then the collected data was exported to SPSS version 23 for editing, cleaning and analysis. Descriptive analysis such as frequency, and percentage were used to describe different characteristics of the study participants. Bivariable and multivariable logistic regression analysis were performed to identify factors associated with failed induction. Variables which found to have p value of < 0.2 in the Bivariable analysis were entered in the multivariable model to identify the predictors of failed induction by controlling possible confounding factors at 95% confidence level. Adjusted odds ratio (AOR) was used to identify the independent predictors of failed induction. P value of < 0.05 was used to state the significance of the association.

Ethical clearance letter was obtained from research ethics committee of Bahir Dar University College of medicine and health sciences. Official permission letters was also obtained from Amhara public health institute and all the respective study health facilities. Written consent was obtained from each study participants before the start of data collection process. Confidentiality and anonymity of the record were ensured throughout the execution of the study by using codes than name of the participants throughout the study.

Results

Socio demographic characteristics

A total of 336 respondents (112 cases and 224 controls) were included in the analysis giving a response rate of 100% for both cases and controls. The mean ages of the study participants were 26.31 and 30.00 years with standard deviation of ±4.94 and ±4.263 for cases and controls respectively (table 1).

Table 1: socio demographic characteristics of the respondents at Amhara region referral hospitals, Ethiopia, 2018

Obstetric and related Characteristics of the study participants

With regards to parity, more than sixty percent, 68 (60.71%) of cases and a tenth, 28 (12.5%) of controls were primiparous. More than ninety percent, 104 (92.86%) of cases and more than forty percent, 97 (43.30 %) of controls were found to have intermediate bishop score (table-2).

Table 2: obstetrics characteristics of the respondents at referral hospitals in Amhara Region, Ethiopia, 2018

Determinant factors of failed oxytocin induction

Table 3 below reveals factors associated with failed oxytocin induction of labor among referral hospitals in Amhara Regional State, Ethiopia. The odds of having failed induction were found to be 2.47 times higher among women who had emergency oxytocin induction compared with counterparts (AOR= 2.47, 95%, CI: (1.31, 4.68)). The odds of having failed oxytocin induction were found to be 11.77 times higher among women who had intermediate bishop score (AOR= 11.77, 95%, CI: (5.19, 26.71)) compared with those who had favorable cervix. In a similar manner, the odds of having failed induction were found to be 6.24 times higher among primiparous women compared with counterparts (AOR=6.24, 95%, CI: (3.32, 11.73)). With regards to age, women who were ≤ 30 years of age were 2.16 times more likely to experience failed induction (AOR= 2.16, 95%, CI: (1.13,4.16)).

Table 3: factors associated with failed oxytocin induction at referal hospitals in Amhara region, Ethiopia, 2018.

Discussion

This study was aimed to identify the determinants of failed oxytocin induction among women who gave birth at five referral hospitals of Amhara Regional State. The multivariable model indicated that the odds of having failed oxytocin induction were found to be 2.47 times higher among women who had emergency induction compared with counterparts (AOR=2.47, 95%, CI:(1.31 ,4.68)). The finding of our study is in contrast to a study conducted in Jimma university which discovered emergency oxytocin induction had no association with failed oxytocin induction (11). This might be related to difference in sample size and study design. Moreover, the discrepancy can be explained by variation in the proportion of intermediate bishop score between studies; 198 (59%) in our study and 68 (24.8%) in the study conducted in Jimma university hospital.

With regards to bishop score, the multivariable analysis indicated that women who had pre induction intermediate bishop score were 11.77 times more likely to experience failed oxytocin induction compared with women who had favorable bishop score. The finding of our study is in agreement with studies conducted in Jimma and USA (11). This might be because of the dependency of oxytocin induction on cervical status. There is less preparation of the pelvis in terms of cervical dilatation, effacement, consistency, station of the presenting part and position of the cervixes which leads to failed oxytocin induction (12 , 13). This discrepancy could be due to the difference in sample size and health service practice in which the presence of subjectivity in assessing bishop score.

With regards to parity, being primiparous was found to be a significant predictor of failed oxytocin induction in our study. The odds of having failed oxytocin induction were found to be 6.24 times higher than those multi parous mothers (AOR: 6.24, 95%, CI: (3.32, 11.73)). The is consistent with different studies at Hawassa, Jimma, Pakistan and Norway (6 , 11 , 12 , 14) . This could be explained by primiparous women are different from multiparous women in pre-induction cervical effacement as well as response to ripening methods. In addition primiparous women have no labor experience hence the rate of cervical collagen fiber dissolution is hard to attain among primiparous women , beside this primiparous uterus could be less sensitive for oxytocin(15).

The odds of failed oxytocin among mothers whose age ≤30 years were 2.16 times higher than counterparts (AOR: 2.16, 95%, CI: (1.13, 4.16)). This study supported by a study done at Pakistan (6) but not supported by studies (9 , 11 , 12) . This is possibly explained by difference in study population.

Conclusion

Women with ages of ≤30 years, having intermediate bishop score, and those who had unplanned oxytocin induction were more likely to encounter failed induction. Appropriate cervical preparations (ripening) shall be considered before commencing induction of labor.

Limitations

The following limitations shall be put into consideration while taking the findings of this study. Due to retrospective nature of the study recall bias might be a concern. The study is conducted at referral hospitals which might not be representative to the general population. Efforts were made to minimize recall bias by complementing interview with medical chart review.

Abbreviations

ANC: Antenatal Care; FHRH: Felege Hiwot Referral Hospital; UoGRH: University of Gondar Referral Hospital; DMRH: Debre Markos Referral Hospital; DRH: Dessie Referral Hospital; DBRH: Debre Birhan Referral Hospital

Declarations

Ethical approval and consent

The study was approved by research ethics committee of college of Medicine and health science of Bahir Dar University. Written official letter was submitted to the study facilities to get permission. Moreover, the purpose of the study was disclosed to the study participants and written consent was obtained from each study participant before initiation of data collection process. Privacy and autonomy of the study participants were maintained.

Consent for publication

Not applicable

Availability of data and materials

The data set used in this study is available from the corresponding author and can be accessible through reasonable request at any time.

Competing interests

We declare that there is no competing interest in this study.

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Authors' contribution

AM, ME, SA, MM and ED contributed to the study design, data collection, analysis, and write-up. All authors read and approved the final manuscript.

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Tables

Table 1: socio demographic characteristics of the respondents at Amhara region referral hospitals, Ethiopia, 201

Socio demographic characteristics of respondents(n=336)	Cases n=112	Controls n=224
Age in years:		
≤30 years	90(80.36%)	127(56.70%)
<30 years	22(19.64%)	97(43.30%)
Residence:		
Urban	77(68.75%)	147(65.63%)
Rural	35(31.25%)	77(34.37%)
Religion:		
Orthodox	94(83.93%)	194(86.61%)
Muslim	14 (12.5%)	26(11.61%)
Protestant	4(3.57%)	4(1.78%)
Ethnicity:		
Amhara	106(94.64%)	212(94.64%)
Oromo	2(1.79%)	1 (0.45%)
Tigrie	1(0.89%)	5(2.23%)
Guragie	3(2.68%)	6(2.68%)
Marital status:		
Married	106 (94.64%)	203(90.63%)
Divorced	5 (4.46%)	17(7.59%)
Widowed	1(0.9%)	4(1.78%)
Occupation:		
Governmental workers	25(23.32%)	40 (17.86%)
Daily laborer	4(3.57%)	13 (5.8%)
Merchant	30(26.79%)	60 (26.79 %)
Hose wife	50(44.64%)	106 (47.32%)
Student	3(1.68%)	5 (2.23%)
Household income in ETB:		
<=1650		58 (25.89%)
1651-3145	24 (21.43%)	
3146-5195	62(55.36%)	127 (56.69%)
	26 (23.21)	36 (16.07%)

>=5196	0	3 (1.35%)

Educational level:

No education	33 (29.46%)	79 (35.27%)
Primary	35 (31.25%)	75 (33.48%)
Secondary and above	44(39.29%)	70(31.25%)

Table 2: obstetrics characteristics of the respondents at referral hospitals in Amhara Region, Ethiopia, 2018

characteristics of respondents(n=336)	Cases n=112	Controls n=224
	N (%)	N (%)
Parity:		
Primiparous	68 (60.71%)	28 (12.5%)
Multiparous	44 (39.29%)	196 (87.5%)
ANC follow up:		
Yes	62 (55.36%)	143 (63.84%)
No	50 (44.64 %)	81 (36.16%)
Bad obstetric history:		
Yes	8 (7.14%)	7(3.12%)
No	104 (92.86%)	217 (96.88%)
Timing of induction:		
Planned	36 (32.14%)	151 (67.42%)
Emergency	76 (67.86%)	73 (32.58%)
Bishop score:		
5-8	104 (92.86%)	97 (43.30 %)
≥ 9	8(7.14%)	127(56.70 %)
Membrane rupture:		
Yes	15(13.39%)	25(11.17%)
No	97 (86.61%)	198(88.83%)
Gestational age:		
<37 weeks	23 (20.54%)	37 (16.52%)
37-42 weeks	81 (72.32%)	174 (77.68%)
>42 weeks	8 (7.14%)	13(5.8%)
Weight of the baby		
<2500 gm	23(20.54%)	28 (12.5%)
2500-4000 gm	80 (71.43%)	185 (82.59%)
>4000 gm	9(8.03%)	11 (4.91%)
Cervix ripening		
Yes	77 (68.75%)	86 (38.39%)
No	35 (31.25%)	138 (61.61%)

Table 3: factors associated with failed oxytocin induction at referal hospitals in Amhara region, Ethiopia, 2018.

Variables	Cases (n=112)	Controls (n=224)	COR(95%CI)	AOR(95%CI)
Timing of induction:				
Emergency	89 (67.86%)	109(32.59%)	4.08(2.41, 6.92)	2.47(1.31 ,4.68)*
Planned	23 (32.14%)	115(67.42%)	1	1
Bad obstetric history:				
Yes	8 (7.14%)	7 (3.12%)	2.38(0.84, 6.75)	1.73(0.45, 6.62)
No	104 (92.86%)	217(96.88%)	1	1
Bishop Score:				
5-8	104 (92.86%)	97 (43.30%)	17.02(7.91, 36.62)	11.77 (5.19,26.71)*
≥9	8 (7.14%)	127 (56.70%)	1	1
Parity:				
Primi parous	68 (60.71%)	28 (12.5%)	10.82 (6.25,18.72)	6.24 (3.32, 11.73)*
Multi parous	44 (39.29%)	196 (87.5%)	1	1
Cervical ripening:				
No	77(68.75%)	86(38.39%)	3.53 (2.18, 5.72)	1.63(0.76, 3.47)
Yes	35(31.25%)	138(61.61%)	1	1
Age in years:				
≤30	90(80.36%)	127(56.70%)	3.13 (1.83,5.34)	2.16 (1.13,4.16)*
>30	22(19.64%)	97(43.30%)	1	1

*Key: AOR: Adjusted odds ratio, COR: Crude odds ratio, * significant in AOR*

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