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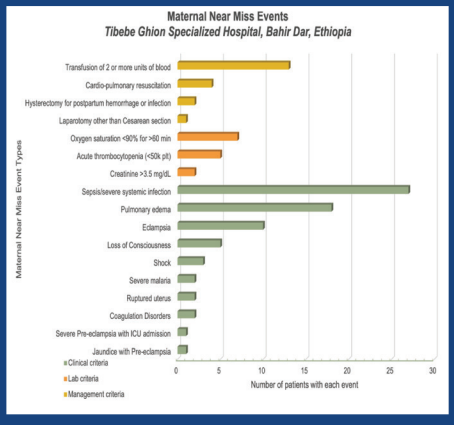

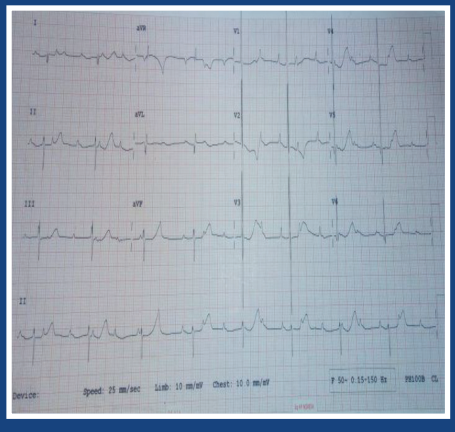

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EVALUATION OF MATERNAL NEAR MISS EVENTS AT TIBEBE GHION SPECIALIZED HOSPITAL IN BAHIR DAR, ETHIOPIA

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ABSTRACT

BACKGROUND: Maternal mortality and morbidity are significant challenges in Ethiopia. The maternal mortality ratio remains high with recent estimates of 412 maternal deaths per 100,000 live births as of 2016 in the nation. Maternal Near Miss events (MNM) are severe morbidities in which a woman narrowly escapes death. In order to develop ways to improve maternal mortality and morbidity, this study sought to estimate: 1) the prevalence of maternal mortality and MNM; and 2) the associated risk factors for these events, at a tertiary referral hospital in Bahir Dar, Ethiopia.

METHODS: This was a cross-sectional study of 658 consecutive delivering pregnant patients and their neonates at Tibebe Ghion Specialized Hospital (TGSH) in Bahir Dar, Ethiopia, from February 26-June 10, 2020. Demographic and outcome data were collected as part of a quality improvement initiative using the REDCap mobile app. Univariate and multivariate logistic regression were used to investigate the relationship between the key demographic and clinical variables with MNM. The creation of the database was approved by the TGSH clinical care committee in February 2020 and the University of Iowa Institutional Review Board approved the de-identified data analyses.

RESULTS: There were no maternal deaths and 70 MNM during the study period. The median patient age was 26 years (IQR 23-30); 49% of women were nulliparous, and 56% delivered vaginally. Patients had higher odds of experiencing MNM if living in a rural area (OR=3.71, $p<0.01$) or with a hypertensive disorder of pregnancy (OR=2.27, $p=0.03$). The postpartum hemorrhage rate was 1.7%.

CONCLUSION: The MNM and mortality rates at TGSH were less than elsewhere in the region. Living in a rural area and having hypertensive disorders of pregnancy were major predictors of MNM events. Future quality improvement projects should be developed to increase antenatal care attendance, help rural women receive antenatal care, and improve treatment for hypertensive disorders in pregnancy.

KEYWORDS: Maternal health, maternal mortality, global health, hypertensive disorders of pregnancy, Ethiopia

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INTRODUCTION

The maternal mortality rate frequently serves as a metric for the quality of obstetric care in a country. High maternal morbidity and mortality remain a challenge in low- and middle-income countries, despite advances in the number of trained obstetricians and availability of hospitals. While Ethiopia was one of many countries that failed to meet the Millennium Development Goal to reduce the maternal mortality ratio (MMR) by 2015, the country made strides in reducing its MMR from 676 maternal deaths per 100,000 live births in 2011 to 412 per 100,000 in 2016.[1, 2] Currently, in the higher income countries, maternal mortality ranges widely from 2 out of 100,000 in Norway to 19 out of 100,000 in the United States.[3] The Sustainable Development Goals now provide a target to reduce the global MMR to fewer than 70 deaths per 100,000 live births and to limit the MMR in any single country to less than 140 maternal deaths per 100,000 live births.[4] Severe maternal morbidity, usually referred to in Ethiopia as Maternal Near Miss (MNM), is often an important marker of cases where a mortality was narrowly avoided, and MNMs are frequently areas where care improvement can be targeted to improve the overall MMR.[5]

At Tibebe Ghion Specialized Hospital (TGSH) in Ethiopia, initial efforts to design quality improvement projects aimed at improving the MMR or avoiding MNM events were limited by a lack of baseline data regarding the causes of morbidity and/or mortality. This study, the Ethiopian Maternal Near Miss (EMNM) Project, was part of an international collaboration formed as an offshoot of the 2015-2018 collaboration between the American College of Obstetrics and Gynecology and the Ethiopian Society of Obstetrics and Gynecology.[6] We aimed to track baseline maternal data for use in future quality improvement initiatives and ultimately help to reduce the MMR. The primary objective of this study was to estimate the prevalence of and contributing factors to maternal mortality and MNM at TGSH in Bahir Dar, Ethiopia.

METHOD AND MATERIALS

A single-institution cross-sectional study was conducted as part of a clinical quality improvement initiative. We developed a Research Electric Data Capture (REDCap) database that tracked demographic and clinical outcome data on all pregnant patients delivering at TGSH. The project was reviewed and approved by the TGSH hospital clinical care committee in February 2020. The Institutional Review Boards at the University of Iowa and TGSH do not require approval for quality improvement projects. The de-identified data review done by University of Iowa researchers was considered exempt by the University of Iowa Institutional Review Board (IRB #201912070).

The WHO Maternal Near Miss criteria modified for Sub-Saharan Africa were used to define MNM. These criteria utilize only clinical, lab, and management elements that are readily available in low-resource settings. Previously, the criteria effectively identified all MNM cases when used in eastern Ethiopia, compared to underreporting that occurred with use of original WHO criteria.[7,8] Our REDCap database was set up for use with the REDCap mobile app, which allows for offline data entry when internet is unavailable.

Bahir Dar, located in northern Ethiopia, is the capital city of the Amhara region. The population of Bahir Dar is approximately 751,000, as of 2016. Patients from Bahir Dar and surrounding communities come to TGSH, a referral institution, for obstetric and delivery care. The hospital is a teaching institution affiliated with Bahir Dar University and hosts medical students and obstetrics and gynecology residents. Twenty-eight weeks gestation is considered the age of infant viability in this setting.

Data were collected between February 26 and June 10, 2020. All patients who delivered at TGSH during the time period were included and there were no exclusion criteria. All data were obtained from hospital paper charts. Data collection was stopped on June 10, 2020 secondary to the COVID-19 pandemic.

Demographic and clinical outcome variables were summarized. The relationship between demographic and clinical variables with MNM events as a primary outcome were analyzed. Secondary outcomes analyzed included hypertensive disorders of pregnancy (HDP) and neonatal Apgar scores. Continuous measures are displayed as counts and percentages. Chi-square tests of independence were performed to examine the relation between two categorical variables. Multivariate logistic regression was used for the relationship between one or multiple predictors with dichotomous outcome variables including MNM events, HDP, or dichotomous Apgar scores. Comparisons with p-values <0.05 were considered statistically significant and those variables found to meet this significance threshold were chosen for multivariable analysis. All analyses were performed using SAS 9.4 (Cary, NC).

RESULTS

There were 658 consecutive deliveries from February 26 to June 10, 2020. Complete data were available for 637. Twenty-one women who delivered during the study period had incomplete clinical charts and they were not included in the data analysis. The total number of deliveries during the study period was verified by comparison to tallies submitted to the Ethiopian Ministry of Health. Subsequent review of the 21 incomplete charts suggested that these were largely precipitous deliveries in which the patient discharged quickly before documentation could be completed.

Patient demographic information is presented in Table 1. The median age of patients was 26 years old (range 15-43, interquartile range (IQR) 23-30); 74.6% were from an urban area. Almost all women (97.5%) reported being married. Approximately 30% of patients reported being unable to read or write, while 19% had attended college or beyond.

Patient antenatal and delivery information is presented in Table 2. Approximately half of patients were nulliparous (48.9%). More than 80% of patients had three or fewer prior pregnancies. Gestational age was most commonly determined by last menstrual period or time of quickening, which led to a wide range of estimated gestational ages. More than two-thirds of patients had four or more antenatal care (ANC) visits.

Table 1. Demographics of patients delivering at Tibebe Ghion Specialized Hospital, Bahir Dar, Ethiopia, 2020 (n=637)

Variable	Statistics
Age in years – Median (IQR)	26 (23-30)
Monthly Income in Ethiopian Birr – Median (IQR)	3000 (1500-5000)
Household Location – n (%)	
- Urban	475 (74.6)
- Rural	162 (25.4)
Distance lived from hospital – n (%)	
- <50km	556 (87.3)
- 50-100km	55 (8.6)
- >100km	26 (4.0)
Marital Status – n (%)	
- Single	11 (1.7)
- Married	621 (97.5
- Divorced	4 (0.6)
- Widowed	1 (0.2)
Education Status – n (%)	
- Unable to read or write	194 (30.5)
- Can read and write	4 (0.6)
- Primary school	183 (28.7)
- High school	135 (21.2)
- College and above	121 (19.0)
Patient Occupation – n (%)	
- Housewife	260 (40.8)
- Farmer	154 (24.2)
- Employee	91 (14.3)
- Merchant	87 (13.7)
- Other	45 (7.1)

Table 2. Antenatal and delivery Information for February 26—June 10, 2020, Tibebe Ghion Specialized Hospital, Bahir Dar, Ethiopia (n=637)

Variable	Category	n (%)
Gravidity (including current pregnancy)	1	279(43.8)
	>1	358(56.2)
Parity (excluding current delivery)	Nulliparous (0)	312 (49.0)
	Multiparous (1-4)	292 (45.8)
Gestational Age of Current Pregnancy (weeks)	Grand Multiparous (>5)	33(5.2)
	28 – 36 weeks	92 (14.4)
	37-42 weeks	373 (58.6)
	> than 42 weeks	51 (8.0)
	Unknown	(19.0)
Plurality of current gestation	Singleton	617 (96.9)
	Twin	20 (3.1)
Did patient receive antenatal care?	Yes	621 (97.5)
	No	16 (2.5)
Number of antenatal visits	1	14 (2.25)[a]
	2	55 (8.86)
	3	126 (20.29)
	4	198 (31.88)
	5	125 (20.13)
	6	64 (10.31)
	7	17 (2.74)
	8	14 (2.25)
	More than 8	7 (1.13)
Location of antenatal care visits	Local Health Center	376 (59.0)
	Other government hospital	48 (7.5)
	Private institution	71 (11.2)
	Tibebe Ghion Specialized Hospital	228(35.8)
Antepartum Complications or Risk Factors	Antepartum hemorrhage	11 (1.7)
	Hypertensive disease [b]	48 (7.5)
	Cardiac disease	3 (0.5)
	Pre-existing or gestational	10 (1.6)
	diabetes	9 (1.4)
	HIV	2 (0.3)
	Malaria	15 (2.4)
	Hepatitis B	34 (5.3)
	Anemia	20 (3.1)
	Syphilis	2 (0.3)
	Maternal age <16 y	58(9.1)
Mode of delivery	Vaginal Delivery	381 (59.8)
	Forceps-assisted vaginal delivery	8 (1.3)
	Cesarean Delivery	248 (38.9)

[a]Antenatal care number of visits calculated for the 621 women that did receive antenatal care
[b]Antepartum hypertension included chronic hypertension, gestational hypertension, and pre-eclampsia diagnosed prior to admission. By time of discharge, it was noted that 100 women had a diagnosis of hypertensive disorder of pregnancy

Antepartum complications included HDP (7.5%), anemia (5.3%), syphilis (3.1%), Hepatitis B (2.4%), gestational or pre-existing diabetes (1.5%), HIV (1.4%), and malaria (0.3%). Several cases of HDP were diagnosed during the delivery admission; by discharge, 100 total cases of HDP had been diagnosed in our study population (15.72%).

There were no maternal deaths at TGSH during the study period. There were 70 patients with MNM, for a prevalence of 11.0%. There were 27 cases (4.2%) of sepsis and 11 cases (1.7%) of postpartum hemorrhage noted. Figure 1 shows the frequency of each type of MNM, based on the WHO MNM criteria modified for Sub-Saharan Africa. Many of the women who met criteria for an MNM had more than one severe event occur.

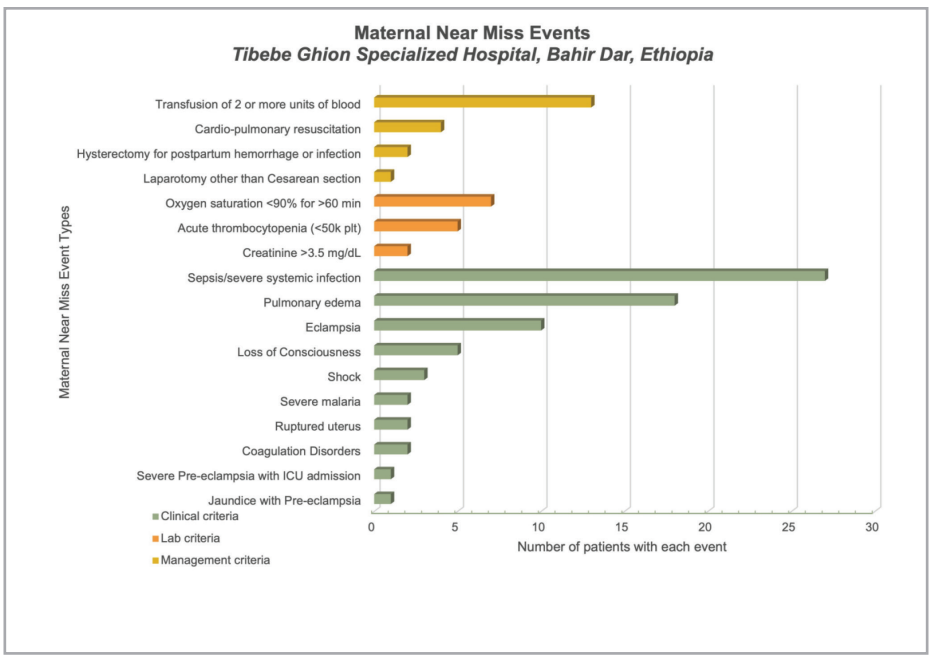

Figure 1 – Number of patients with specific Maternal Near Miss (MNM) events. Frequency of qualifying MNM events using the WHO Maternal Near Miss events tool adapted for Sub-Saharan Africa. There were 70 patients with MNM events, but 105 events total given that some patients met criteria with more than one qualifying event.

Table 3. Association of key demographic and clinical variables with experiencing a Maternal Near Miss (MNM) 2020, (n=70 patients with MNM events; n=100 patients with Hypetensive Disorders of Pregnancy)

Variable	MNM		AOR (95%CI)	p-value
	N	%		
Hypertensive disorders of pregnancy				
-Yes	61	61.00%	10.41 (6.06-17.91)	<0.01
-No	39	39.00%		
Location:				
-Rural	36	22.22%	3.71 (2.23-6.17)	<0.01
-Urban	34	7.16%		
Distance lived:				
-50-100km	14	25.45%	4.07 (2.06-8.07)	<0.01
->100km	13	50%	11.93 (5.20-27.39)	<0.01
-<50km	43	7.73%		
Occupation:				
-Employee	5	5.49%	.26 (.10-.71)	<0.01
-Merchant	5	5.75%	.27 (.10- .74)	0.01
-Other	7	15.56%	.83 (.34-2.05)	0.68
-Housewife	25	9.62%	.48 (.27-.86)	0.01
-Farmer	28	18.18%		

Table 3 shows the association of key demographic and clinical variables with MNM. In the bivariate analysis, the odds of experiencing MNM was 3.71 times higher for women living in a rural area than women living in an urban area (95% CI: 2.23-6.17; p <0.01). Patients' occupation was a significant predictor for MNM events (p<0.01). When controlling for number of ANC visits, patient age, education status, number of prior deliveries, and current gestational age, women who identified as farmers were more likely to experience MNM (AOR 3.51, 95% CI: 1.72-7.17; p<0.01). The patients' age, income, and education level were not found to be statistically significant risk factors for having an MNM.

Analysis of our secondary objectives revealed that distance from the hospital was correlated with having HDP (p<0.01). Specifically, the crude odds ratios of having HDP were 3.72 (95% CI: 2.02-6.85; p<0.01) and 6.04 (95% CI: 2.68-13.61; p<0.01) for patients living 50-100 km and more than 100 km, respectively, compared to those living less than 50 km away. The relationship between HDP and dichotomous location (rural vs urban) was not significant. Earlier gestational age of delivery was also significantly related to experiencing HDP (p<0.01). Further analyses in a multivariable logistic model showed that patients delivering at a gestational age of 28-37 weeks had higher odds of having HDP than full-term patients (AOR=2.39, 95% CI: 1.23-4.65, p=0.01).

Bivariate logistic regression was also fit to test the relationship between HDP and MNM or Apgar scores. In women with HDP, the crude odds of having an MNM were 10.41 times higher (95% CI: 6.06-17.91; p<0.01) and the crude odds of having a newborn with an Apgar score <7 at 5 minutes was 2.27 times higher (95% CI: 1.05-4.90; p=0.04). However, there was no significant difference for the 1 min APGAR score (COR=1.84, 95% CI: 0.92-3.67, p= 0.08).

DISCUSSION

In this study of all deliveries over a 3.5- month period at a tertiary referral hospital in Bahir Dar, Ethiopia, maternal morbidity and mortality were lower than in surrounding regions. HDP were the most common obstetric complications, and a major contributor to maternal morbidity.

The MNM rate at TGSH was 11% during our study period, which is less than half that (23%) found in a study of the surrounding Amhara region in 2015.[9] That study included 806 women from 5 regional hospitals, and many demographic characteristics were similar to the current study. However, some differences included that half of the mothers in the Amhara regional study reported being illiterate whereas only 30% of the mothers in the TGSH study were. The median monthly income was higher in the TGSH study at 3000 Birr (about $80) as opposed to 2000 Birr (about $50) in the Amhara regional cohort. The education and income level differences may be explained by the urban to rural ratio in each study; the ratio was 75:25 in the TGSH study and 38:62 in the Amhara regional hospital cohort. These differences in the two populations may explain some of the differences between the findings in the studies.

The amount of prenatal care received in our study was higher than both that seen in the previous study of Amhara and elsewhere in Ethiopia. In the past, the WHO recommended a minimum of 4 ANC visits, but updated this recommendation to 8 visits in 2016.[10] According to the most recent Ethiopian Demographic and Health Survey, 43% of pregnant women received at least 4 ANC visits,[2] as did 66.7% of patients in our study. However, only 3.38% of women at TGSH had 8 or more ANC visits. We identified increasing ANC attendance as a future focus for quality improvement projects. A recent systematic review found that despite proven benefits of excellent ANC, research on interventions to improve ANC adherence in sub-Saharan Africa is extremely limited.[11] Interventions focused on incentives to attend

care or improved planning of visits were effective[11] and serve as a suggestion for potential future projects at TGSH.

The women in this study who lived in a rural area were found to have higher odds of experiencing MNM (OR=3.71) and the further patients lived from the hospital, the more likely they were to have HDP. This is similar to findings from a matched case-control study in the Tigray region of Ethiopia, just north of Bahir Dar, which noted that women from rural areas had nearly twice the prevalence of HDP compared to their matched controls (OR=3.7, 95% CI; 1.9-7.1)[12]. Our study did not assess what factors may have caused rural women to have more adverse events; however, this is an area ripe for further study. Others have proposed interventions to improve transportation to bring rural women to skilled obstetric care,[13] as well as improved communication on transfer between rural health posts and higher-level care.[14] These provide potential models for future interventions.

The most significant contributors to maternal morbidity in our study were HDP with a prevalence of 15.7% (100 women). The WHO attributes 14% of all global maternal deaths to HDP[15]. A 2012 study showed that 19% of maternal deaths in Ethiopia were due to HDP[16], and a 2018 meta-analysis found that about 6% of all pregnancies in Ethiopia were complicated by a hypertensive disorder.[17] The TGSH prevalence rate is over twice that of the national average, which likely reflects TGSH being a referral hospital. The finding of an association of preterm gestational age with hypertension in this cohort is likely because serious hypertensive disorders could justify iatrogenic preterm delivery. Given the high prevalence of HDP in the cohort, and the fact that HDP were the biggest risk factor for MNM, improved care for HDP was identified as a major area to target future quality improvement projects. Implementation of a safety bundle to improve the care of HDP, for example, could help prevent MNM events and improve maternal and neonatal outcomes, as has been done elsewhere.[18] .

It was unexpected that the rate of postpartum hemorrhage in our study was quite low (1.73%). A recent chart review of 144 patients within the same region of Ethiopia showed a postpartum hemorrhage rate of 7.6%[19]; the rate in the United States is approximately 3%.[20] We did not evaluate methods for estimating blood loss and it has been noted elsewhere that even experienced clinicians frequently underestimate blood loss at time of delivery.[21,22] Another potential intervention may be to specifically evaluate blood loss quantification at time of delivery in order to recognize hemorrhage and assure that patients with a hemorrhage are managed in a timely fashion. A project that included quantification of postpartum blood loss in a similar setting in Malawi serves as a model.[23].

The implementation of this project as part of an international academic collaboration is itself notable. Others have recommended this type of collaboration as a way to address maternal health improvement goals in low-resource settings.[6, 24] While electronic records had not previously been used at TGSH due to unstable internet availability, REDCap mobile was identified as a feasible tool, given that data could be entered offline and uploaded later when internet was available. International collaborators helped with development of the database and trained local collaborators to implement the data collection system. Communication via international messaging applications, emails, and video calling was essential to maintain strong involvement and collaboration from both sides, particularly during the unprecedented travel restrictions of the COVID-19 pandemic.

Strengths of this study included prospective capture of all consecutive births during the study period. Limitations included the single center design, which may not completely reflect regional population-based maternal mortality or morbidity. While TGSH specializes in maternal care, it has limited Intensive Care Unit capacity. Thus, some critical obstetric patients may be routed to another regional hospital, which was not documented.

In conclusion, maternal morbidity and mortality were lower than elsewhere in Ethiopia in this study from Bahir Dar. The study findings emphasize the importance of antenatal care, maternal literacy and education, and perinatal care challenges for patients living in rural locations. HDP were common and led to significant morbidity; care for these HDP are an area ripe for future intervention and quality improvement projects. The PPH rate was unexpectedly low and merits further investigation. Antenatal care is not yet at the new target of the WHO's recommendations and can be improved. Thus, this cross-sectional study of maternal care in Bahir Dar, Ethiopia, illustrates current maternal care strengths and challenges and also highlights opportunities for future quality improvement initiatives.

DECLARATIONS

Author Contributions

JDH wrote the initial draft of the article and analyzed the data; MBR was the international principal investigator, helped conceive of the initial idea for the study, directed implementation, and significantly revised and edited the manuscript; AmM designed the REDCap database, helped implement the database on-site, did initial data collection, and edited the manuscript; EM, KK, and ASM helped conceive of the initial idea for the study, directed initial implementation of the study on site, and edited the manuscript; BW helped with REDCap on-site training, initial data collection, and manuscript editing; NA trained data collectors and assisted with initial project implementation and manuscript editing; CW performed statistical analysis and wrote key portions of the manuscript; AW was the on-site principal investigator for the study, oversaw all aspects of the study implementation and edited the manuscript.

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Conflicts of Interest

The authors report no conflicts of interest.

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AN OBSERVATIONAL STUDY OF TREATMENT OUTCOMES OF UTERINE MYOMA AMONG CLIENTS WHO HAD UNDERGONE INVITRO FERTILIZATION AT A PUBLIC CENTER IN ADDIS ABABA, ETHIOPIA

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ABSTRACT

BACKGROUND: For clients undergoing invitro-fertilization (IVF), there is no consensus regarding the management of non-cavity-distorting intramural myoma.

BACKGROUND: To assess the prevalence and treatment outcomes of IVF clients with uterine myoma.

METHODS: A 2-year (April 1, 2019–April 1, 2021) chart review was conducted for 1300 infertile women who had undergone IVF. Categorical data were summarized in proportion, and continuous data were summarized using the mean, median, and standard deviation where appropriate. Bivariate logistic regression was conducted to assess the association between predictor variables and the outcome variable (clinical pregnancy). P-values of 0.05 were considered significant.

RESULTS: Of the total 1,300 IVF clients, 282 (21.7%) cases were diagnosed as having myoma. Among the 13 cases of cavity-distorting intramural myomas who underwent IVF without myomectomy, all were negative for clinical pregnancy, whereas among the 60 cases of cavity-distorting myomas who had pre-IVF myomectomy followed by IVF, 16 (26.7%) were positive for clinical pregnancy. This difference was not statistically significant (P = 0.160).
38 (27.5%) of 138 cases of non-cavity-distorting intramural myoma who underwent IVF without pre-IVF myomectomy had clinical pregnancy. In contrast, among the 19 cases who had undergone pre-IVF myomectomy followed by IVF, only 2 (10.5%) had a clinical pregnancy. This difference was not statistically significant (P = 0.160).

CONCLUSION: While not statistically significant, conducting a pre-IVF myomectomy for cavity-distorting myomas improves the clinical pregnancy, whereas a pre-IVF myomectomy does not improve the clinical pregnancy for women with non-cavity-distorting myomas. We recommend further research with a larger sample size.

KEYWORDS: Myoma; infertility; invitro fertilization; myomectomy; treatment outcomes

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INTRODUCTION

Invitrofertilization (IVF) is a multifaceted series of procedures used to help with fertility and assist with the conception of a child. IVF begins with ovarian stimulation with exogenous gonadotropins, followed by the picking of oocytes from the ovaries under transvaginal ultrasound guidance, fertilization, embryo culture, and finally the transfer of embryos into the uterus[1]. Myoma-related infertility has been linked to various factors, including cervix displacement, which reduces sperm exposure; uterine cavity enlargement or deformity, which interferes with sperm transport; obstruction of the interstitial segment of the fallopian tubes; distorted adnexal anatomy, which interferes with ovum capture; distortion of the uterine cavity; increased or abnormal myometrial contractions, which inhibit sperm or embryo transport and impair uterine blood flow; and chronic endometritis, or decreased endometrial receptivity, interfering with implantation[1,2]. Uterine myomas are benign smooth muscle neoplasms arising from a single smooth muscle cell of the myometrium [2].

Myomas are the most prevalent tumors, affecting 30% of reproductive age women, and at least half of those who have them have no symptoms[3]. Myomas are seen in five to ten percent of infertile women[4, 5]. Additionally, myomas are the only abnormal finding in one to two percent of women with infertility[6].

There is clear unanimity that submucous myomas have a substantial adverse effect on clinical pregnancy rates[6-12]. Existing data also support the conclusion that submucous myomas increase the risk for miscarriage by more than threefold[11, 12]. However, the impact of non-cavity distorting myoma on the possibility of abortion is unclear[13]. Studies regarding the effect of intramural myomas on IVF success were found to be conflicting, with some reporting less favorable outcomes[14-18] and others not[11, 19-24].

The accrued body of evidence shows that submucous myomas reduce IVF success rates by 70%, intramural myomas by 20–40%, and subserosal myomas have no adverse effect on outcomes[1]. It is clear that submucous myomas have important adverse effects on pregnancy and pregnancy outcomes and that myomectomy improves both[1].

Evidence for the benefits of myomectomy in women with non-cavity distorting intramural myomas is less compelling, probably because their effect on fertility is not as great[1].

Decisions regarding the management of infertile women with asymptomatic intramural myomas are among the most challenging clinical judgments. There is no agreement regarding the management of intramural myoma that is not distorting the endometrial cavity[1]. As the results of the existing studies regarding the management of intramural myomas for IVF clients are inconsistent, there is no clear guideline. Therefore, this study aims to assess the management of myomas in general and intramural myomas in particular and their pregnancy outcomes among IVF clients at our clinical site in Addis Ababa, Ethiopia.

METHODS

This study was conducted at the Center for Reproductive Medicine (CFRM) clinic. The CFRM was established on April 1, 2019, and is a branch of Saint Paul's Hospital Millennium Medical College (SPHMMC). This clinic provides all reproductive health, endocrinology, and IVF services in a dedicated building. There are four outpatient clinics: two of them are for reproductive health services, and the other two are for the evaluation of infertile couples and endocrinology clients. On average, 100 infertile clients visit the CFRM clinic on working days, and the clinic is open from 2:30–6:30 am and 1:30–5:30 pm, seven days per week. The service is run by Reproductive Health and Endocrinology (REI) fellows and specialists.

Ethical approval was obtained before the start of the data collection from the Institutional Review Board of St. Paul's Hospital Millennium Medical

College. The ethical approval ID is PM23/280. A chart review of those infertile women who had undergone IVF in the past 2 years (April 1, 2019–April 1, 2021) was done. All charts of women diagnosed with myoma were taken for further data abstraction using the Open Data Kit (ODK). The charts of all women diagnosed with myoma were complete with the information that we required. The data collection tool in the Open Data Kit(ODK) was tested on 5% of the study population and the validity checked before the start of data collection. The data was entered into ODK, cleaned, and then exported to Stata 14 for analysis. Summarization using frequency distribution was done for the clients' socio-demographic characteristics. The mean and median were calculated for the clients' ages. A Chi-square test was used to test associations between categorical variables and outcome variables. The intention was to do bivariate analysis followed by multivariate analysis for those factors that have significant association with outcome variable, but we found no significant association between the predictor variables and outcome variable so only a bivariate logistic regression model was fitted to identify predictors of the outcome variable. A p-value of less than 0.05 is considered statistically significant, with a 95% confidence interval.

The outcome variable is a clinical pregnancy (ultrasound-confirmed pregnancy), which is dichotomized as "yes" or "no." The predictor variables are the type of myoma treatment (myomectomy versus no myomectomy), the location of the myoma (intramural cavity distorting, intramural non-cavity distorting, and submucous), the age of the woman, dichotomized as "<=35" and ">35," and the type of protocol for IVF. Intramural myomas are myomas that are located in the uterine muscle, and they are classified as cavity-distorting and non-cavity-distorting. Submucous myomas are myomas that are located in the uterine cavity.

There are two main types of protocols based on the type of gonadotropin-releasing hormone (GnRH) analogue used: agonist and antagonist protocols. During the long protocol, GnRH agonists are given during the luteal phase of the menstrual cycle, and ovarian stimulation using gonadotropins is started on days 2 or 3 of the menses. For the antagonist protocol, ovarian stimulation is started using gonadotropins on days 2 or 3 of menses, and the GnRH antagonist will be started when the dominant ovarian follicle reaches a size of 14 mm. Mild stimulation is a modification of the antagonist protocol where the ovarian stimulation is started on the 2nd day of menses using an oral aromatase inhibitor (Letrozole) and stimulation with gonadotropins is initiated on the 4th day. The woman will be started on antagonist medication when the dominant follicle reaches a size of 14 mm. Long protocols are used for young women with good ovarian reserve, whereas antagonist and mild stimulation protocols are used for women with poor ovarian reserve, previous poor responses to long protocol stimulation, and women over the age of 35[1].

RESULTS

Among the total of 1,300 women who underwent IVF during the study period, 282 (21.69%) were diagnosed with myoma.

Socio-demographic characteristics and profiles of women who have undergone IVF treatment are shown in Table 1. The mean age of the women was 34.1 years, with a standard deviation of 4.2 years. The majority (62.8%)—177 (62.8%)—of the 282 cases of myoma are 35 years old or younger. Most women, 254 (90.1%), were nulliparous, and the majority, 246 (87.2%), had no history of abortion.

As shown in Table 1, the majority, 230 (81.6%), were diagnosed with intramural myoma. The majority of the 230 intramural myoma cases—157 (68.3%)—were non-cavity distorting. Among the 85 cases who had undergone pre-IVF myomectomy, most—57 (67.1%)—were done for cavity-distorting myomas. The majority, 74 (87.1%) of women had undergone laparotomy for myomectomy. For most women, a 69.9% mild stimulation protocol was used.

Table 1 Sociodemographic characteristic and profiles of women who have undergone Invitro-fertilization treatment at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia (n= 282 unless otherwise specified)

Characteristics*	No.	%
Age in years		
<=35	177	62.8
>35	105	37.2
Number of children		
Nulliparous	254	90.1
Primiparous	28	9.9
Number of abortions		
0	246	87.2
1	18	6.4
≥2	18	6.4
Submucous Myoma	14	5.0
Intramural Myoma	230	81.6%
Intramural Myoma (n=230)		
Not cavity distorting	157	68.3
Cavity distorting	73	31.7
Subserous	38	13.5%
Pre_IVF Myomectomy		
No	197	69.9
Yes	85	30.1
Location of myoma[a] (n=85)		
Submucous	10	11.8
Intramural cavity distorting	57	67.1
Intramural not cavity distorting	16	18.8
Subserous	2	2.4
Type of Myomectomy (n=85)		
Laparotomy	74	87.1
Laparoscopic	6	7.1
Hysteroscopic	5	5.9
Type of IVF protocol		
Long	73	25.9
Ministim/Mildstimulation	197	69.9
Antagonist	11	3.9
Other	1	0.4

a- for which the woman had undergone Pre-IVF myomectomy

As shown in Figure 1, the majority, 142 (50.32%) of women, were diagnosed to have tubal factor infertility; 45 (14.18%) were diagnosed to have both tubal factors and decreased ovarian reserve (DOR); 41 (14.54%) were diagnosed to have male factor; 22 (7.8%) were diagnosed to have tubal factor and male factor; and 15 (5.32%) of them were diagnosed to have unexplained infertility. Among the 230 women diagnosed with intramural myoma, 56 (24.3%) were pregnant, and among these 56 pregnant women, the majority, 38 (67.9%), did not undergo pre-IVF myomectomy compared to 18 (32.1%) who had undergone pre-IVF myomectomy. Among the 13 cases of cavity-distorting intramural myoma who have undergone in vitro fertilization without myomectomy, all 13 cases were negative for clinical pregnancy. Whereas, among 60 cases of cavity-distorting myomas who have undergone pre-in vitro fertilization myomectomy followed by in vitro fertilization, 16 (26.7%) were positive for clinical pregnancy. Among a total of 14 cases of submucous myoma, 12 (85.71%%) cases had undergone pre-IVF myomectomy and 2 (15.38%) had not. The 2 cases of submucous myoma who tried IVF without Myomectomy both were negative for clinical pregnancy whereas among the 12 cases who had undergone Pre-IVF myomectomy, 3 (25%) had a clinical pregnancy.

There were 38 (27.5%) clinical pregnancies among 138 cases of non-cavity-distorting intramural myomas that had undergone in vitro fertilization without pre-invitro fertilization myomectomy. among the 19 cases who had undergone pre-IVF myomectomy followed by IVF, only 2 (10.5%) of them had a clinical pregnancy.

As shown in Table 2, women over the age of 35 have an 80% lower likelihood of clinical pregnancy than women under the age of 35 (COR 0.2; 95% C.I. 0.10-0.42; P = 0.000). Women who received a mild stimulation protocol had a 78% lower chance of achieving pregnancy than women who received a long stimulation protocol (COR 0.22; 95% C.I. 0.12- 0.39; P = 0.000).

As shown in Table 2, women who had undergone pre-IVF myomectomy for cavity-distorting intramural myoma had no statistically significant association with clinical pregnancy compared to women with cavity-distorting myoma without pre-IVF myomectomy (COR 3.10; 95% C.I. 0.64–14.9; P = 0.160). Additionally, women who had undergone pre-IVF myomectomy for non-cavity-distorting myoma had no statistically significant association with clinical pregnancy compared to women who had not undergone pre-IVF myomectomy for non-cavity-distorting myoma (COR 0.32; 95%C.I. 0.10-1.56; P = 0.160).

Table 2. Bivariate logistic regression analysis of predictors of clinical pregnancy among clients who have undergone Invitro-fertilization treatment at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia (n= 282)

Variables	Crude Odds Ratio (95% C.I)	P-Value
Age >35	0.20 (0.10 - 0.42)	0.000**
Mild stimulation protocol	0.22 (0.12 - 0.39)	0.000**
Pre-IVF myomectomy [a]	0.32 (0.10 -1.56)	0.160
Pre-IVF myomectomy [b]	3.10 (0.64 - 14.9)	0.160
Cavity distorting [c]	0.82 (0.42 - 1.60)	0.559
Non-cavity distorting [c]	1.22(0.63 - 2.36)	0.559

IVF-Invitro fertilization
a-for non-cavity distorting intramural myoma
b-for cavity distorting intramural myoma
c-Intramural Myoma

DISCUSSIONS

In this study, 22% of women were diagnosed with myoma. In the two cases of submucous myoma who tried IVF without myomectomy, both of them were negative for pregnancy, whereas among the 12 cases that had undergone pre-IVF myomectomy for submucous myoma, 3 (25%) had a clinical pregnancy. There were 38 (27.5%) clinical pregnancies among 138 cases of non-cavity-distorting intramural myomas that had undergone invitro fertilization without pre-IVF myomectomy. In comparison, only two (10.5%) of the 19 who had pre-IVF myomectomy followed by IVF had clinical pregnancy. Among the 13 cases of cavity-distorting intramural myomas who underwent invitro fertilization without myomectomy, all 13 cases were negative for clinical pregnancy. This compares to the 60 cases of cavity-distorting myomas who had pre-IVF myomectomy followed by IVF, where 16 (26.7%) of them were pregnant.

In this study, almost 22% of women were diagnosed with myoma. This is in contrast to other studies which showed myomas in 5–10% of infertile women [4, 5]. Further, while only 7 of our participants (0.5%) had myomas as their only abnormal finding, in other studies, this rate is 1-2% [6].

Previous research has consistently shown that submucous myomas have a profound adverse effect on the clinical pregnancy rate[6–12]. Similarly, in this study, there are 2 cases of submucous myoma who tried IVF without myomectomy; both were negative for pregnancy, whereas, among the 12 cases who had undergone pre-IVF myomectomy for submucous myoma, 3 (25%) had a clinical pregnancy.

Evidence for the benefits of myomectomy in women with intramural myomas (not distorting the uterine cavity) is less compelling, probably because their impact on fertility is not as great[1]. Similarly, 38 (27.5%) of 138 cases of non-cavity-distorting intramural myomas who underwent in vitro fertilization without pre-in vitro fertilization myomectomy had clinical pregnancy in this study. In comparison, only two (10.5%) of the 19 who had pre-IVF myomectomy followed by IVF had clinical pregnancy. Therefore, there is no benefit in doing a myomectomy for a non-cavity-distorting myoma.

Decisions regarding the management of infertile women with asymptomatic intramural myomas are among the most difficult clinical judgments. There is no consensus regarding the management of intramural myoma that is not distorting the endometrium[1]. In this study, while doing a pre-IVF myomectomy does not have a statistically significant impact on clinical pregnancy, all 13 cases of cavity-distorting intramural myomas that underwent in vitro fertilization without myomectomy were

negative for clinical pregnancy. This compares to the 60 cases of cavity-distorting myomas that underwent pre-IVF myomectomy followed by IVF, where 16 (26.7%) of them were pregnant. So according to the findings of this study, there is a clear benefit to doing a myomectomy for intramural myomas that distort the uterine cavity.

CONCLUSION

While not statistically significant, conducting a pre-IVF myomectomy for cavity-distorting myomas improves the clinical pregnancy, whereas a pre-IVF myomectomy does not improve the clinical pregnancy for women with non-cavity-distorting myomas. We recommend further research with a larger sample size.

DECLARATIONS

Strengths of this study

- The findings of this study can be generalized to other settings since the patient populations (patients with myoma requiring IVF treatment) are the same worldwide.
- Compared to previous researches, this research has a larger sample size, since most of the existing researches have smaller sample size

Limitation of this study

- The nature of our research being a retrospective can be one limitation but it is unethical to do prospective observational or randomized controlled trial
- While we have collected data over two years, the number of cases with myoma is still small to result in statistical significance

Author contribution

AT contributed to the study planning, design, data collection and analysis, and writing of the manuscript. MN contributed to the study planning, data analysis, and editing of the manuscript. FS contributed to the study planning and editing of the manuscript.

Conflict of Interest

The authors have no conflict of interest

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HEALTH BELIEF MODEL ATTITUDES OF IRAQI WOMEN TOWARDS BREAST CANCER AND ITS EARLY DETECTION METHODS

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ABSTRACT: Health Belief Model is a very effective paradigm designed to explore behaviors, especially in breast cancer prevention. This study aimed to determine women's attitudes regarding breast cancer by using Health Belief Model and the interaction between attitudes and practice. This prevalence survey was performed on a consecutive sample of 657 women visiting the primary healthcare centers in Baghdad/ Iraq. The data were collected over four months in 2019. A specially designed questionnaire of modified and translated health belief model related to breast cancer was adopted and filled out through face-to-face interviews. The age of participants was between (20-59) years. The majority (95.3%) considered detecting health problems early as a target for them. Most of them (93.6%) believed that some activities can improve their health. Women with adequate practice of Breast Self-Exam had higher perceived benefits, susceptibility, and motivation than those who inadequately practiced it. Women with adequate practice of mammography had higher perceived benefits and health motivation, and lower barriers, threat, and severity of breast cancer other than those with inadequate practice. Those participants who were more likely to perform the Clinical Breast Examination adequately were with higher levels of perceived seriousness and health motivation. Study results suggested that practices of screening for breast cancer were inadequate in a majority of participants and need to be improved by educational health programs.

KEYWORDS: Health Belief Model, Breast Cancer, Early detection, Iraq, Mammography.

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INTRODUCTION

Breast cancer (BC) is the most repeatedly detected cancer in females globally, with around 2.3 million cases diagnosed in 2020[1]. At the end of 2020, the data showed that about 7.8 million females with breast cancer were newly reported during the last five years, making it the world's most prevalent cancer[2]. In Iraq, the incidence of breast malignancies alarmingly raised from 52.00 per 100,000 in 2000 to 91.66 per 100,000 in 2019[3]. It ranked first in the death rate (15.3%) among all cancer types in Iraq[4]. Studies suggested increasing survival from breast cancer when detected as early as possible[5]. Other studies' statistics showed that cervical and breast cancer are the leading cancers in women who live in developing countries[6].

Health Belief Model (HBM) is a psychosocial paradigm that is considered for health behaviors by recognizing such factors as they are related to individuals' beliefs that influence the behavior of patients[7]. Health Belief Model has been used globally to examine patients' beliefs, especially those related to screening behaviors for BC[8]. The most recent conceptualization of the HBM encompasses the following components: perceived susceptibility of the patient, severity, barriers, benefits, and finally, cues to action along with self-efficacy[9]. Therefore, a woman who thinks she is susceptible to breast malignancies or cancer, especially if it is severe, will increase her probability of performing breast examinations regularly or other behaviors. Also, a woman would be more likely to perform a Breast Self-Examination (BSE), especially if she supposes more benefits with fewer barriers to BSE[10].

In Iraq, few studies have been conducted in recent years to assess the attitudes towards BC early detection measures according to HBM[11]. Thus, this study was designed to evaluate the effect of HBM associated with breast malignancies among women in the community to early detection practice.

METHOD AND MATERIALS

An observational analytic cross-sectional study was performed in Primary Health Care Centers (PHCCs) selected in Baghdad province. All of them were providing Maternal and Child Health (MCH) services.

Using the sample size equation for a cross-sectional study, the required sample size was 687. All women between the ages of 20 and 60 years from different socioeconomic statuses were interviewed. We excluded women with any past or present breast pathology requiring medical care, a first-degree relatives' history of breast cancer, and those presenting with an acute disease that prevents them from being enrolled in the study. There are six PHCC districts in Baghdad city, and one PHCC from each district had been randomly selected. So, the total number of the included PHCCs was six.

In each PHCC, a non-random convenient sampling procedure had been used for the inclusion of the subjects. All women entering the center who fulfilled with inclusion criteria were interviewed after explaining the aim of the study.

The researcher interviewed for three months starting from February to April 2019 using a structured questionnaire form designed from the HBM questions derived from a study in Malaysia[12] with some summarization and modifications to be suitable to the Iraqi community, translated from English to Arabic, and tested for validity by two expert professionals, and tested for reliability by a pilot study. The practice was either adequate or not according to the ACOG and the NCCN for average-risk women[13].

Data analysis: Was done by SPSS version 26. Frequency and percentage were used to represent categorical variables. Mean and standard deviation were used for other continuous variables. For independent samples, a t-test was used to assess the dissimilarities in means between two independent groups of patients considering a P-value as significant if it is equal to or less than 0.05. The quartile method was used to calculate the crowding index as an indicator of social class because there

was no acceptable cut-off value for this social variable in Iraq.

Ethical consideration: Formal approval from Wasit University/School of Medicine was obtained before the study. Verbal consent was taken from the participants who accepted to engage in this study after explaining the aim of this research and their freedom to refuse to answer any question and leave at any time they want.

The questionnaire stated the anonymity of respondents with no identification of names or contact information. Interviews were conducted in a discreet corner/room, away from other persons witnessing or overhearing the conversation.

Results:

Out of 687 eligible women, only 657 agreed to participate in the study with a response rate of (95.6%). The age range was (20-59) years with a mean of (37.5±11.3) years. Table 1 shows the sociodemographic features of the participant women. Around one-quarter (22.8%) of them were illiterate and without formal education, with (20.2%) with university and higher degree education. Nearly two-thirds of the respondents (71%) were housewives, and none of the responders was a part-time employer or student. Only (17.7 %) with low social class while (34.5 %) were with high social class.

Table 1: Frequency distribution of socio-demographic characteristics of 657 women attending 6 PHCCs in Baghdad in (February –April) 2019.

Socio-demographic variables	Number	Percentage
Educational level		
Illiterate/read and write	150	22.8
Primary school	125	19.0
Intermediate school	125	19.0
Secondary school	124	18.9
University/higher degree	133	20.2
Total	**657**	**100**
Employment status		
Never worked	467	71.0
Was employed but not now	30	4.6
Full–time employee	160	24.4
Total	**657**	**100**
Social classes		
High social class	227	34.5
Middle high class	102	15.5
Middle low class	212	32.3
Low social class	116	17.7
Total	**657**	**100**

Table 2 shows the HBM items´ positive responses related to BC and its early detection. Only (19.3%) of respondents thought they were more than the average women to get BC. Most of the women (76.4%) were scared from thinking about BC. The majority (95.3%) agreed or strongly agreed that they want to discover health issues as early as possible. An overwhelming majority (90.4%) either agreed or strongly agreed with the statement: If I have performed monthly BSE then it will aid me to find a lump that might be breast cancer earlier than being detected by a doctor or a nurse. Around one-quarter (26%) mentioned embarrassment as a perceived barrier for BSE. The majority of participant women (91.2%) were confident in their abilities to identify normal and abnormal breast tissue when doing BSE. The most frequent barrier (58.3%) reported for a mammogram was: not knowing how to go about getting a mammogram. About (89.5%) recognized the benefit of a mammogram to find lumps early.

Table 2: Frequency distribution of positive HBM attitudes items related to breast cancer and early detection items.

Selected attitude items in HBM	Number	Percentage
Attitude items for breast cancer		
Perceived susceptibility		
In the future, I feel I will get breast cancer.	275	41.9
I'm more likely to be susceptible to breast cancer than the average women	127	19.3
Perceived seriousness		
The thoughts of breast cancer scare me	502	76.4
Getting breast cancer would threaten my relationship with my husband.	318	48.4
My whole life would be changed if I had breast cancer,	441	67.1
Perceived health motivation		
Detecting health problems early is a target for me	626	95.3
I feel carrying out activities that can improve my health is important to me	615	93.6
I will be committed to regular health check-ups even if I'm healthy	547	83.3
Attitude items for breast self-examination		
Perceived benefits		
Doing a self-breast examination makes me feel positive about my well-being.	571	86.9
Performing regular monthly breast self-examination will decline the chances of dying due to breast cancer	563	85.7
Performing monthly regular breast self-examination will help me to discover a lump that might be breast cancer earlier than detection by a doctor or nurse.	594	90.4
Perceived barriers		
Performing breast self-examination will embarrass me	171	26.0
Too much time could be taken when performing a breast self-exam	223	33.9
Having enough privacy that allows me to perform breast self-exam is a real issue for me	108	16.4
Perceived confidence		
I'm confident that I can properly perform breast self-examination.	418	63.6
I'm able to discover a breast lump that is as small as a pea	512	77.9
I'm confident in my ability to identify normal or abnormal breast lumps or tissue while performing regular breast self-examination	599	91.2
Attitude items for mammogram		
Perceived benefits		
I feel confident about my health when I have been advised to do a mammogram	541	82.3
Discovering breast lumps earlier when having a mammogram on regular basis.	588	89.5
Decreasing the chances to do radical breast surgery if I will commit to performing mammogram regularly.	532	81.0
Perceived barriers		
How to go and get a mammogram for breast is a problem for me	383	58.3
Finding something wrong in my breast or breast lump makes me afraid of performing a mammogram	255	38.8
Having a mammogram would be too embarrassing for me	227	34.6
Too much time will be consumed when having a mammogram	178	27.1
I have other problems more important than getting a mammogram	167	25.4
I would be exposed to unnecessary radiation when performing a mammogram	146	22.2
Too much money to spend when having a mammogram	112	17.0
Having a mammogram would be too painful	108	16.4

In table 3, only 33 (5%) had adequate monthly practice BSE. Only 22 (7.6%) women had mammograms adequately (annually) for those above 40 years. There were 36 (5.5%) who followed the recommended routine examination schedule for Clinical Breast Examination (CBE).

Table 3: Frequency distribution of adequacy practice early detection procedures.

Adequacy of practicing	Number	Percentage
Adequacy of practicing breast self-examination		
Adequate (monthly exam starting from the age of 20)	33	5
Not adequate	624	95
Total	657	100
Adequacy of practicing mammography above 40 years		
Adequate (at least once a year from age 40)	22	7.6
Not adequate	266	92.4
Total	288	100
Adequacy of practicing clinical breast examination		
Adequate [a]	36	5.5
Not adequate	621	94.5
Total	657	100

a) Every three years for the age range (of 20-39) and then yearly afterward

Table 4 shows that women with an adequate practice of BSE had higher mean scores of perceived confidence, benefits, health motivation, and susceptibility than those who did not. No significant differences in perceived barriers to BSE and perceived seriousness of breast cancer between the two groups were found.

Table 4: Comparison of the mean perceived HBM items between those who adequately practiced BSE and those who did not.

Attitude score	The practice of BSE [a]		P-value (t-test)
	Not adequate	Adequate [b]	
Perceived health motivation			<0.001
Range	(20 - 100)	(66.7 - 100)	
Mean	88.1	96.8	
SD	13.8	9.1	
n	624	33	
Perceived seriousness			0.77[NS]
Range	(20 - 100)	(53.3 - 80)	
Mean	73.3	72.1	
SD	22.7	5.4	
n	624	33	
Perceived susceptibility			0.002
Range	(20 - 100)	(20 - 70)	
Mean	48.5	62.1	
SD	24.3	17.5	
n	624	33	
Perceived barrier to BSE			0.12[NS]
Range	(20 - 115)	(20 - 60)	
Mean	48.8	55.8	
SD	25.6	11	
n	624	33	
Perceived benefit of BSE			<0.001
Range	(20 - 100)	(88 - 100)	
Mean	80.5	98.5	
SD	21.6	4	
n	624	33	
Perceived confidence in BSE			<0.001
Range	(20 - 100)	(66.7 - 100)	
Mean	80.1	95.6	
SD	17	10	
n	624	33	

a) Breast self-examination.

b) monthly exam starting from the age of 20 years old.

As shown in Table 5, women with higher perceived benefits and lower recognized barriers to mammograms had adequate practice for mammography. Women with the adequate practice of mammography had a significantly higher perceived health motivation, lower perceived seriousness, and perceived susceptibility compared with those who inadequately did it.

Table 5: Comparison of the mean perceived HBM scores between those who adequately practiced mammography and those who did not.

Attitude score	The practice of mammograms (only for those 40+ years of age)		P-value (t-test)
	Not adequate	Adequate [a]	
Perceived health motivation			0.049
Range	(20 - 100)	(66.7 - 100)	
Mean	87.3	93	
SD	13.4	8.8	
n	266	22	
Perceived seriousness			<0.001
Range	(20 - 100)	(20 - 100)	
Mean	74.7	54.8	
SD	19.3	39.7	
n	266	22	
Perceived susceptibility			0.035
Range	(20 - 100)	(20 - 60)	
Mean	48	38.2	
SD	21	20.4	
n	266	22	
Perceived benefit of mammography			<0.001
Range	(24 - 96)	(68 - 100)	
Mean	77.5	95.3	
SD	20.6	7.3	
n	266	22	
Perceived barrier to mammography			<0.001
Range	(27.5 - 95)	(20 - 67.5)	
Mean	55.9	25.2	
SD	20.7	10.1	
n	266	22	

a) Annual examination from age of 40.

Table 6 shows that women who regularly performed CBE perceived more seriousness and health motivation. No significant associations between perceived susceptibility and CBE practice were found in this study.

Table 6: Comparison of the mean perceived HBM scores between those who adequately practiced CBE and those who did not.

Attitude score	Practice for CBE [a]		P-value (t-test)
	Not adequate	Adequate [b]	
Perceived health motivation			<0.001
Range	(20 - 100)	(73.3 - 100)	
Mean	88.1	95.9	
SD	13.8	9.3	
n	621	36	
Perceived seriousness			<0.001
Range	(20 - 100)	(60 - 100)	
Mean	72	93.9	
SD	22	13.1	
n	621	36	
Perceived susceptibility			0.83[NS]
Range	(20 - 100)	(30 - 70)	
Mean	49.1	50	
SD	24.8	7.9	
n	621	36	

a) Clinical Breast Examination.

b) Every 3 years for the age range (20-39) and then yearly afterward.

DISCUSSION:

The beliefs that can have a positive effect on women's early detection methods and practices can be understood well by using the HBM variables for the assessment by health planners. Raising awareness among Iraqi women will increase the likelihood of earlier breast cancer detection. Identifying and reducing the barriers to early detection of breast cancer can be achieved by such results.

Based on the HBM, screening behaviors are negatively associated with assessed barriers while positively associated with concepts of vulnerability, severity, confidence, advantages, and motivation [10]. According to this study's results, the women who performed BSE regularly (adequate) were more likely to gain more BSE advantage, and the ability to perform BSE with more confidence, more perceived probability of breast cancer, and place a higher value on their health than those who had never or inadequately performed this behavior.

Women who were more likely to practice regular BSE were those who perceived themselves as more vulnerable to breast cancer (perceived susceptibility) and gained more confidence in their preparedness to perform BSE (perceived confidence); the findings above were in parallel with the HBM constructs. In addition, the probability of engaging in such behavior is high for women who gained more benefits from BSE. The same was found in the previous research performed among Iranian females[14].

No association was found between the considered barriers to BSE and adequate practice of BSE, and this is contrary to HBM. This finding can be explained that it may be related to very few numbers of women who mentioned barriers to BSE. Only 16.4% mentioned the absence of privacy to do BSE as a barrier, while some suggested that it requires too much time. Around one-quarter thought it was embarrassing to them. On the contrary, Iranian women[15] perceived lower barriers among those performing BSE than those not or inadequately performing this test.

In addition, this study did not detect a significant association between the perceived seriousness of BC and adequate practice of BSE. This may partly be explained by the fact that most women in this study agreed with the seriousness of BC, but they thought that they would acquire it if they just thought of it. As other studies found, the seriousness of the condition itself could not be able alone to raise awareness regarding preventive health behaviors. The BC itself will lead to change in women's life by influencing all aspects of life including the psychological, social, financial, and so on and this subject is known to many women[16]. The idea that a woman has about not being susceptible or immune to breast cancer and that only a few would be affected by breast cancer may lead to low compliance to regular BSE as the results show in the current study or the lack of promotion or raising the culture of BSE and its advantages for breast cancer early detection.

In this study, only 7.6% of women aged 40 years and above underwent yearly mammography in compliance with the international recommendations, similar to that of a Malaysian study[17].

Considering the mentioned barriers when planning for a health program would be wise enough to design a proper intervention to improve mammography practice. One of the suggested solutions, especially for those who are too busy or less mobile, is to use a moving vehicle scan or temporary mobile places near the target population. In Iraq, mammography is relatively free, so few women in this study thought that the cost of mammography was a barrier.

Women who adequately practiced mammography perceived lower seriousness and susceptibility to BC than those with inadequate practice, contrary to the HBM concept. Most of the women in this study didn't consider themselves susceptible to breast cancer. However, a significant percentage of them in this study considered BC itself as a serious condition. Many reasons could explain this finding and one of them is due to a lack of BC and screening practice culture or promotion of women's belief in fatalism, i.e., It is all the will of God so detecting the condition in an early or even late stage will not have any effect on the results. This was also supported by another researcher in Jordan[18].

Another study conducted in Turkey found that the rates of performing mammography were statistically higher in those who felt at risk compared to those that did not[19].

In Malta, a study found that the most important variables to delineate the differences between

lifetime attendees and non-attendees were perceived benefits, barriers, and cues to action[20].

CONCLUSIONS AND RECOMMENDATIONS:

The lower screening rate in women was associated with their beliefs and perceptions of preventive health measures. Improving breast cancer screening practices may be achieved by emphasizing breast cancer awareness through educational health programs and by minimizing the identified barriers. Providing accurate information regarding breast cancer will aid reduce women's fear. Women might need help to increase confidence regarding the BSE technique and its benefit for them.

This study recommends the increase of the awareness and advocacy campaign on breast cancer in the country. Also, extending of periodic screening programs. Emphasize more on using the latest methods to deliver health information related to breast cancer and this includes the use of social media and animated videos and finally through TV channels. To investigate different women's motivation issues that are related to practicing early detection behaviors, further researches are also needed as motivation showed significant relation to all 3 practices.

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PREVALENCE AND ASSOCIATED FACTORS OF POSTPARTUM FAMILY PLANNING UPTAKE AMONG MOTHERS DELIVERED AT MEKELLE PUBLIC HOSPITALS, NORTHERN ETHIOPIA

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ABSTRACTS

BACKGROUND Postpartum family planning has the potential to reduce maternal and child morbidity and mortality. A short birth interval of less than two years is associated with adverse health effects for the mother and baby and the society as a whole. Postpartum contraceptive uptake is one of the lowest in Ethiopia.

OBJECTIVES The aim of this study was to determine the magnitude and associated factors of postpartum family planning acceptance in Mekelle public hospitals from 1 April to 31 July 2022.

METHODOLOGY The cross-sectional study design was employed. Data were collected prospectively using an interviewer-administrated structured questionnaire. In both hospitals (i.e. Mekelle General Hospital and Ayder Comprehensive Specialised Hospital), 399 mothers were interviewed in their immediate postpartum period. Data were analysed using the Statistical Package for Social Sciences (SPSS) version 22. In addition to descriptive statistics, Pearson's chi-square test was used for bivariate analysis of socio demographic and reproductive health factors and postpartum family planning. Multiple logistic regressions was used to explore factors associated with postpartum contraceptive use.

RESULTS The prevalence rate of family planning uptake in the immediate postpartum period was 17.8% (n=71). More than a third (n=152, 38.1%) of mothers in this study did not receive appropriate family planning. Slightly more than half (52.8%) intend to use contraceptives at 6 weeks postpartum. Compared to those who did not counseled, those who were counseled were ten times more likely to receive postpartum family planning (AOR=10.1, 95% CI: (3.911-26.375). Women who gave birth by cesarean delivery used family planning twice more than those who gave vaginally (AOR = 1.954, 95% CI: (1.072-2773).

CONCLUSION Despite the high-risk obstetric population in teaching hospitals, a small proportion of women used family planning. Furthermore, many women did not receive appropriate counseling on postpartum family planning. Counseling was the most significant factor influencing postpartum modern contraception uptake. Because referral and teaching hospitals host a large number of high-risk mothers, immediate postpartum family planning uptake should be considered a very important element of care. Previous studies have reported that most women who planned to come for contraceptive uptake 6 weeks postpartum do not actually come. Therefore, timely (ie, periconceptional and antepartum) and appropriate counseling should be advocated to increase the immediate adoption of postpartum family planning.

KEYWORDS: Postpartum family planning, counseling, contraception,

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INTRODUCTION

Postpartum family planning (PPFP) refers to the prevention of closely spaced pregnancies during the first 12 months after childbirth[1]. The postpartum period is critical to address widespread unmet needs in family planning and to reduce the risks of closely spaced pregnancies[2]. Previous reports have shown prenatal visits[3, 4], place of delivery[3, 5, 6], postnatal visits[4, 7], family planning counseling during antenatal care (ANC) and postnatal care (PNC)[8, 9], resumption of menses after birth[4, 10]. to be the key predictors of postpartum modern contraceptive use.

Globally, family planning (FP) is recognised as a key life-saving intervention for mothers and their children[1]. Postpartum family planning has an important role to play in strategies to reduce the unmet need for FP[1]. Postpartum women are among those with the greatest unmet need for FP. However, they often do not receive the services they need to support longer birth intervals or reduce unintended pregnancy and its consequences[1]. Postpartum family planning addresses the needs of those who wish to have children in the future (referred to as 'spacers'), as well as those who have reached their desired family size and wish to avoid future pregnancies (referred to as 'limiters')[1].

According to an analysis of data from Demographic and Health Surveys in 27 countries, 95% of women who are 0-12 months postpartum want to avoid a pregnancy in the next 24 months; but 70% of them did not using contraception[1]. Family planning can avert more than 30% of maternal deaths and 10% of child mortality if couples space their pregnancies more than 2 years apart[1]. According to the World Health Organisation (WHO) technical consultation committee for better maternal and child health outcomes, an interval of at least 2 years is recommended after a live birth before becoming pregnant again[11]. Pregnancies that occur within one year of the mother's previous birth are more risky for the health of both the mother and the child than those occurring later[12] , and children born within one year of a previous birth have a higher risk of mortality than those born after longer intervals[13]. Closely spaced births are also associated with an increased chance of chronic undernourishment, stunted growth, and infant mortality[12] .

In Ethiopia, evidence has been found that almost half (47%) of all pregnancies occur within a short birth interval of less than 24 months after the preceding birth[14]. Postpartum women are an important group because they may not realize that they are at risk of pregnancy even if they are breastfeeding[15]; therefore, focussing efforts on increasing postpartum contraceptive use among these women could have a proportionally greater impact than focussing attention on other populations. However, in Ethiopia, policy makers are under emphasised contraceptive use in the postpartum period is under emphasized by policy-makers[16]. Identifying factors that hinder the use of postpartum contraceptives is essential for communities, because the length of postpartum insusceptibility is declining[17], as a result of urbanisation, economic development, and social and cultural changes[18] .

According to Ethiopian demographic and health survey (EDHS) 2016, the median birth interval is 34.5 months; therefore, half of nonfirst births occur within 3 years after the first birth. One in three births (32%) occur within 24 to 35 months of previous birth, and one in five births (21%) occur within at least 3 years after the previous birth. In Ethiopia, the pregnancy-related mortality ratio was 412 maternal deaths per 100,000 live births; the mortality rate is 67 deaths per 1,000 live births, and the infant mortality rate is 48 deaths per 1,000 live births[17].

Consequently, it is very important to initiate contraception in the postpartum period to avoid tragic maternal and child morbidity and mortality. Teaching hospitals host a high number of high-risk mothers that benefit the most from birth spacing. The failure of family planning is taken as a missed opportunity. Studies on postpartum Contraceptive use and associated factors are limited in Ethiopia, especially in the study area. Thus, this study sought

to examine the prevalence of postpartum modern contraception use and associated factors in Mekelle teaching hospitals.

METHODS AND MATERIALS

Study Design and setting

A cross-sectional study design was employed to collect data prospectively using a structured questionnaire. Data were collected from April 1-July 31, 2022. This study was conducted in Mekelle Public Hospitals (ie, Mekelle General Hospital and Ayder Comprehensive Specialised Hospital). Both hospitals differ as an academic setting with 5000 deliveries per year each. Both hospitals serve primarily as a catchment referral centers for high-risk mothers.

Sample size and sample procedure

The sample size of the study was calculated using OpenEpi, Version 3, open source calculator: considering the 48% prevalence of postpartum modern contraceptive use in Aksum[19]. Statistical power is 80 and confidence interval is 95%. With 10% nonrespondents, the final calculated sample size was 406.

Sampling Procedure

Mothers were interviewed in their postpartum period after receiving their discharge summary. Using a systematic probability sampling technique, each third mother was asked for consent to be interviewed and enrolled in the study.

Operational Definitions and terminologies

Postpartum contraception: defined as the initiation and use of a contraceptive method after childbirth, but before discharge from hospital.

Awareness of modern contraception: if mother at least mention one modern contraceptive.

Immediate postpartum period: refers to the period after delivery of the placenta until discharge.

Lactational amenorrhoea: It was taken as a modern contraceptive if the mother mentioned the criteria to be fulfilled 1) Exclusive breast feeding 2) Amenorrhoea 3) Used only in the first 6 months.

Family planning: is the planning of when to have children, the use of birth control and other technique to implement such plans.

Cohabiting: defined as living together and having sexual relationship but not married.

Data Collection Instrument and Procedures

A structured and pre-tested questionnaire was prepared first in English language and translated into the local language (Tigrigna), and then backtranslated into English language in order to assess its consistency. The translation from English to Tigrigna and from Tigrigna back to English was carried out by different individuals fluent in both Tigrigna and English languages. Thirteen junior residents were trained on the objectives of the study, the format of the data collection and data collection techniques. Data collection was started on April 1, 2022 with the first postpartum patients discharged from both hospitals.

The principal investigator pretested the questionnaire in 5% of the study population at Quiha Hospital, a public hospital in Mekelle. The principal investigator selected and orientated the principal investigator on a uniform and proper way to administer the questionnaire, and keep the data safe. The principal investigator oversees the data collection procedure in both hospitals. The principal investigator also supervises the timeliness of the study. The questionnaire was developed for data collection on the main variables needed (sociodemographics, characteristic of socio-economic status and reproductive factors).

Data were coded, entered, cleaned and analyzed using Statistical Package for Social Science (SPSS) version 22 by the principal investigator. For descriptive analysis, continuous variables were summarized using means, medians and standard deviations (SDs), while categorical variables were summarized using proportions. Bivariate and multivariate logistic regressions were used to identify factors associated with postpartum modern contraceptive use. Variables with a p-value<0.2 in the bivariate analysis were fitted into a multiple logistic regression model to control for confounding effects. Adjusted odds ratios (aOR) with 95% CIs were used to identify factors associated with

postpartum modern contraceptive use. The p-values less<0.05 were considered statistically significant of the associations with postpartum modern contraceptive use.

Ethical Considerations

Ethical clearance was obtained from the Institutional Review Board of the Mekelle University College of Health Sciences and then submitted to the medical director's office of the Ayder comprehensive specialized hospital and the Mekelle general hospital before the start of the study. Participants were asked for their informed verbal consent. Their right to refuse from the outset or refuse in the middle was maintained. They were informed that their participation or refusal thereof will not be associated with the service they will receive then or in the future. Names and other identifiers were not used to collect data and confidentiality was maintained throughout the study.

RESULTS

Socio-demographic distributions

Of 406 women recruited, 399 responded, giving a response rate of 98.3%. More than half (n=201, 53.9%) were from the comprehensive specialised hospital of Ayder and the remaining (n=184, 46.1%) were from Mekelle General Hospital. The sociodemographic profile of the participants is described in Table 1.

Table 1 : Sociodemographic profile of women who gave birth in public hospitals, 2022

Socio-demographic characteristics	Category	Frequency (N=399)	Percent
Age	15-19	14	3.5
	20-24	91	22.8
	25-29	145	36.3
	30-34	80	20.1
	Above 35	69	17.3
Place of Residency	Rural	47	11.8
	Urban	352	88.2
Education status of the mother	Illiterate	22	5.5
	Primary	90	22.6
	Secondary	151	37.8
	College and above	136	34.1
Site	ACSH	215	53.9
	MGH	184	46.1
Marital status	Married	387	97
	Single	8	2.0
	Cohabiting	3	0.8
	Divorce	1	0.3
Religion of mother	Christian	376	94.2
	Islam 23	5.8	
Occupation	Employed	126	31.5
	Unemployed	248	62.2
	Merchants	25	6.3
Partner level of education	Illiterate	39	9.9
	Primary	80	20.3
	Secondary	132	33.5
	College and above	143	35.8

ACSH: Ayder Comprehensive Specialised Hospital,
MGH: Mekelle General Hospital

Reproductive and Contraceptive History

In 73 (18.3%) of the study participants, the index pregnancy was not planned. The main reasons mentioned for the appearance of unplanned pregnancy were; lack of availability of family planning options (n=31,42.5%), lack of awareness about family planning (n = 28, 38.4%) and contraception failure (n=14,19.1%). About three-quarters of the mothers in this study have ever used some form of family planning (Table 2).

Table 2 Reproductive and contraceptive history in women who gave birth in Mekelle public hospitals, 2022

Variable	Category	Frequency	Percentage
Parity(N=399)	Primipara	132	33.1
	Para 2 to 4	229	57.4
	Grand multipara	38	9.5
ANC(N=399)	Hospital	156	39.1
	Private	184	46.1
	Health center	52	13
	No ANC	7	1.8
Maternal serostatus (N=399)	Non-reactive	385	96.5
	Reactive	14	3.5
Abortion (N=399)	Yes 1 to 3	64	16.0
	Above 3	1	0.3
	No Total	65	16.3
		334	83.7
Gestational age at first visit(N=399)	First trimester	102	25.6
	Second trimester	238	59.6
	Third trimester	21	5.3
	Unknown	31	7.8
	No ANC	7	1.7
Ever used contraceptives (N=399)	Yes	301	75.4
	No	98	24.6
Family planning method used before (N=301)	Injectable	154	51.2
	Pill	46	15.3
	IUD	9	3.0
	Implant	74	24.6
	Emergency contraceptive	14	4.6
	Lactation amenorrhea	2	0.7
	Others	2	0.7
Problems experienced with use of contraceptives (N=301)	Yes	110	36.5
	No	191	63.5
Action taken for the problem experienced (N=110)	Prematurely stop usage	54	49.1
	Removed at appropriate time	47	42.7
	Switch to other	9	8.2
	Yes	326	81.7
	No	73	18.3
Unplanned pregnancy(N=73)	Family planning was not available	31	42.5
	Contraceptive failed	14	19.1
	Lack of awareness	28	38.4

Antepartum and current contraceptive use

Of the 399 participants 71 (17.8%) received some form of contraceptive in their immediate postpartum period. Most of these opted for implants as their family planning of choice. The main reasons mentioned by the respondents for declining contraceptive uptake in the immediate postpartum period are; intending to receive family planning in the latter 6 weeks, fear of side effects, and the inaccessibility of family planning of choice (Table 3).

Table 3: Postpartum contraceptive uptake among women who gave birth in Mekelle public hospitals, 2022

Variable	Category	Frequency	Percentage
Received antepartum / postpartum family planning counseling (N=399)	Yes	247	61.9
	No	152	38.1
Have taken/agreed to any form of postpartum family planning(N=399)	Yes	71	17.8
	No	328	82.2
Type of family planning taken/agreed(N=71)	Bilateral tubal ligation	2	2.8
	IUD	8	11.3
	Lactation amenorrhea	12	16.9
	Implants	49	69
Taking what was chosen antepartum (N=71)	Yes	57	80.3
	No	14	19.7
Reasons for changes in decision (N=14)	Providers advice	7	50
	My husband disapproves	1	7.1
	I am afraid of side effects	5	35.8
	Not available	1	7.1
Reasons for using family planning (N=71)	Birth spacing	68	95.8
	Complete family size	3	4.2
Reason for not using family planning(N=328)	I want to have another child	20	6.1
	My husband disapprove	11	3.4
	It is harmful to the health of my child	2	0.6
	The family planning of my choice is not available	45	13.7
	I am breast feeding	18	5.5
	I am afraid of side effects	46	14
	I intended using contraceptive later at 6 weeks	172	52.4
	Husband away	14	4.3

Factors affecting postpartum contraceptive use

In the index pregnancy, 42.6% gave birth by cesarean delivery. Almost half (n=x, 46%) of the study participants had a previous scared uterus (Table 4).

Table 4: Factors affecting postpartum family planning uptake among women who gave birth in Mekelle public hospitals, 2022

Variable	Category	Frequency	Percentage
Place of delivery (N=399)	Hospital	398	99.7
	Home	1	0.3
Mode of delivery(N=399)	Vaginally	229	57.4
	Cesarean sections	170	42.6
Outcome of the current pregnancy(N=399)	Alive	395	98.9
	Still birth	3	0.8
	Early neonatal death	1	0.3
Number of Cesarean delivery scar(N=399)	0	217	54.4
	1	137	34.3
	2	25	6.3
	3	20	5
Male partner involved during counseling (N=247)	Yes	227	91.9
	No	20	8.1
Counseled about side effects (N=247)	Yes	207	83.8
	No	40	16.2
Provider fully addressed all concerns (N=247)	Yes	227	91.9
	No	20	8.1
	Total	247	100
Usefulness of information provided by providers concerning family planning(N=247)	Useful	219	88.7
	Somewhat useful	27	10.9
	Not useful	1	0.4

In the binary logistic regression analysis, 14 variables were analysed. These were age, residence, marital status, education status, partner education status, occupation, ANC and number of visits, gestational age at first visits, timing of counseling, previous side effects of contraception, parity, history of abortions, mode of delivery, and number of scars. From these age, parity, counseling, and mode of delivery were identified as independently associated with postpartum modern contraceptive use with a P value< 0.25.

Multiple logistic regression shows that comparing women who had counseling on family planning with those who did not, the former had 10 times higher odds of using modern postpartum contraceptives than the later [(AOR= 10.157, 95% CI: (3.911-26.375)]. Women who deliver via cesarean section have two-time odds of using modern contraceptive compare to counterpart who deliver vaginally.

Table 5. Binary and multivariate logistic regression for the factor associated with postpartum family planning use among women who gave birth at public hospitals, 2022

Variable	Category	Postpartum family planning use		COR(95%CI)	P- value	AOR(95%CI)	P-value
		Yes	No				
Age	(15 – 19)	1	13				
	(20 – 24)	14	77	0.423(0.051-3.497)	0.425	0.672-(0.073-6.157)	0.725
	(25 – 29)	30	115	0.295(0.037-2.344)	0.248	0.480(0.053-4,358)	0.514
	(30 – 34)	11	69	0.483(0.057-4.065)	0.503	0.918(0.093-9.082)	0.942
	Above 35	15	54	0.277(0.033-2.291)	0.234	0.421(0.041-4.293)	0.466
Parity	Primipara	19	113				
	Para 2 to 4	46	183	0.669(0.373-1.199)	0.177	0.792(0.389-1.612)	0.521
	Grand multiparous	6	32	0.897(0.330-2.433)	0.831	1.647(0.471-5.766)	0.435
Abortion	Yes	7	64				
	No	58	270	0.509(0.222-1.168)	0.111	0.505(0.210-1.212)	0.126
Counseling	Yes	66	181	10.720(4.210-27.302)	<0.001	10.157(3.911-26.375)	<0.001
	No	5	147	1		1	
Mode of delivery	Cesarean section	41	129	2.108(1.253-3.548)	0.005	1.954(1.072-2.773)	0.029
	Vaginal delivery	30	199				

DISCUSSION

The study sought to investigate postpartum contraceptive prevalence among postpartum mothers and to explore factors that determine the use or nonuse of modern contraceptive use. Contraceptives, the study showed that awareness about contraception was high. However, less than half (17.8%) of participants were using a modern contraception method at the time of the studies. Factors such as counseling and mode of delivery, were found to be significantly associated with postpartum contraceptive use. There was no significant association between history of abortions, level of education, number of scars, parity, and postpartum contraceptive use.

The study shows that 98.7 percent of the respondents were aware of at least one modern method of contraception that can be used after delivery. The level of awareness is similar to 99 percent reported in EDHS 2016 for all women between 15-49 years[17]. Another study carried out in Ghana on the prevalence and associated factors of the utility of modern contraception level of awareness was lower 76.4%. This lower rate found in the Ghana study is expected because the respondents were young women (15-25 years of age)[20].The main source of contraceptive information was healthcare workers, similar to study carried out in Ghana[20].

Despite the high knowledge, the prevalence of postpartum modern contraceptive use was only 17.8%. This finding is lower than the modern contraceptive prevalence rate of 35% found during the EDHS of 2016 survey for all women aged between 15-49 years[17]. It is also lower than other studies done in Aksum 48%[21]. The lower rate in the present study could be due to the disruption of the health system in the ongoing war. Additionally, the study conducted in Aksum was extended to 6 weeks postpartum while our study included only mothers in their immediate postpartum period.

The most popular modern contraceptive methods used by postpartum women in this study implanon

69% followed by LAM 16.9%, IUD 11.3%and BTL 2.8%. This can be explained in light of women's preferences for contraceptive methods and the attitudes toward contraceptive methods. This is in contrast to study done in Aksum were injectable contraceptives (59.7%), implants (24.7%) and pills (12.0%) (21), Gondar town(4) and a 2014 report from the Ethiopian Demography Health Survey[17]. However, it is important to note that both injectable and combined oral contraceptives are contraindicated in the immediate postpartum period. Since our study enroled women in their immediate postpartum period, injectable and combined oral contraceptives cannot be of choice.

Factors associated with postpartum contraceptive use

Multivariate analysis showed that the association between family planning counseling during ANC, the intrapartum, and postpartum period was found to be associated with modern contraceptive use during the postpartum period. Women who had received family planning counseling had 10 times odds of using contraceptive comparing to those who were not counseled. This result agrees with those of studies conducted in Aksum[21], Malawi[9] and North America[8].

Women who deliver by cesarean section were at two-time increase in the chance of using modern contraceptive compared to counterpart who deliver vaginally. This could be related to the specific institutional protocol that advocates for a two-year period spacing for women giving birth by Cesarean delivery. This could have increased the vigilance of healthcare providers to provide strict counseling during the postpartum period.

The low uptake of contraception despite a high knowledge of FP reflects the existence of barriers to use. Some of the most common reasons women in the present study have not using immediate postpartum family planning are: they want to start using family planning 6 weeks postpartum, because they wanted to have another child, disapproval of their husband, and because their spouse lives away from them, thus there is no need to use. Some other women also stated reasons for refusing to use immediate postpartum family planning, such as: because they think family planning can be harmful to their child, their choice of family planning is unavailable, because they think breast feeding can prevent pregnancy, for fear of side effects. Similar reasons were mentioned in other studies conducted in both Ethiopia and outside[4, 5, 9, 21]. This finding highlights the importance of solving barriers to contraceptive uptake during the postpartum period. Consistent with the previous discussion, most of the barriers cited can be solved through detailed oriented counseling during the periconceptional and anterpartum periods.

CONCLUSIONS

Despite the high-risk obstetric population in teaching hospitals, a small proportion of women used family planning. Counseling was the most important determinant factor for modern contraceptive uptake in the postpartum period. Despite having ANC follow-up, 38.1% of mothers were not counseled. Despite a large body of evidence supporting the importance of family planning counseling during antenatal care follow up, majority of mothers were counseled in the postpartum period. The advantages of postpartum contraception use towards the wellbeing of mother and child cannot be overemphasized. Therefore, we recommend that adequate counseling on the relevance of available family planning options should be provided. and their fears adequately addressed by family planning service providers during every interaction with clients. The health care provider should practice family planning counseling during all contacts, including periconceptional, antenatal, and reaffirm choices, and provide family planning services in the postpartum period.

DECELARATION

Authors' Contribution

TJ: Conceived the research idea, formulated the research question, data collection tool, data analysis, and wrote the manuscript. FT and BA:

Supervised the entire process of the research project, participated in the design of the questionnaire, analysis, and reviewed the manuscript. AW and HT: Participated in the analysis, write up, and review of the manuscript. All authors have read and approved the final manuscript for publication.

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PREVALENCE OF PRETERM PREMATURE RUPTURE OF MEMBRANE AND ASSOCIATED FACTORS AMONG PREGNANT WOMEN ADMITTED IN HIWOT FANA COMPREHENSIVE SPECIALIZED UNIVERSITY HOSPITAL, EASTERN ETHIOPIA

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ABSTRACT

BACKGROUND: Preterm premature rupture of membrane (PPROM) affects approximately 3% of all pregnancies and is responsible for one-third of all preterm births. Despite its contribution to maternal and neonatal mortality and morbidity, evidence on the burden of PPROM and its associated factors in the study area is scarce. Therefore, this study was aimed to assess the prevalence and associated factors of PPROM among preterm pregnancies managed from May 2019 to September 2020 at Hiwot Fana Comprehensive Specialized University Hospital University Hospital, Eastern Ethiopia.

METHODS: A hospital-based retrospective cross-sectional study was conducted among 449 preterm pregnancies selected by systematic random sampling technique. Data related to socio-demographic variables, obstetric and reproductive health conditions, and labor and related pregnancy outcomes were extracted from their medical records using a structured checklist. Factors associated with PPROM were identified using bivariable and multivariable logistic regression. Association was presented using an adjusted odds ratio (AOR) along with 95% confidence interval (CI). P-value <0.05 in the final model was considered as statistically significant.

RESULTS: Of 449 preterm pregnant women included in the study, 64 (14.3%; 95% CI:11.1% -17.5%) had PPROM. Preterm PROM was significantly associated with urinary tract infections (AOR=6.33; 95% CI:3.26-12.29), vaginal bleeding (AOR=2.62; 95% CI:1.23-5.57), history of abortion (AOR= 3.07; 95% CI:1.33-7.06) and mid upper arm circumference <23 (AOR=7.06; 95% CI: 4.02-12.43). A total of 3 (4.3%) stillbirth and 16 (22.9%) early neonatal deaths occurred corresponding with a gross perinatal mortality rate of 271 per 1000 births.

CONCLUSION: This study showed that one in seven preterm pregnancies in eastern Ethiopia had PPROM. Urinary tract infection, vaginal bleeding, previous history of abortion, and undernutrition were associated with PPROM. Early screening and treatment of urinary tract infections and nutritional assessments are essential to reduce the risk of PPROM.

KEYWORDS: Associated factors, Eastern Ethiopia, Preterm, Premature Rupture of Membrane

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INTRODUCTION

Premature rupture of the membrane (PROM) is the rupture of fetal membranes before the onset of labor and it can occur as preterm PROM or term PROM[1]. Preterm premature rupture of membrane (PPROM) is the spontaneous rupture of the amniotic membrane with a release of amniotic fluid before the onset of labor before 37 weeks of gestation[2]. The incidence of PROM ranges from 5% to 10% of all pregnancies worldwide[2]. The prevalence of PROM varies widely in different countries and it ranges from 6.3% to 13.8% in African populations [3–6]. Preterm PROM affects approximately 3% of all pregnancies and is responsible for one-third of all preterm births[2,7,8]. Although PPROM occurs both in developed and developing countries, its prevalence is high in African and Asian countries. The prevalence of PPROM accounts for 3.1% in Brazil[9], 2.2% in India[10], 3.3% in Nigeria[11], and it ranges from 6.6% to 13.7% in Ethiopia[12,13].

Although the causes of PPROM are complex and multifactorial[14–16], intrauterine infection has been implicated as a major etiological factor in the pathogenesis and subsequent complications[17]. Moreover, PPROM will end up in preterm birth, becoming one of the leading causes of perinatal morbidity and mortality with severe subsequent problems[7,18]. Studies showed that history of PPROM increased the risk of recurrent PPROM and preterm delivery by 20 and four-folds, respectively [19]. In addition, preterm infants may be vulnerable to a variety of problems including respiratory distress syndrome, hyaline membrane disease, intraventricular hemorrhage, periventricular leukomalacia, neurologic impairment, bacterial infection, and necrotizing enterocolitis[20]. Given the fact that preterm babies have higher risk of death from prematurity or bacterial infection as a result of the ruptured membrane, and there is increased maternal risks and infections, assessing burden of PPROM and identifying associated factors is essential for designing appropriate interventions [2,21].

Burden of PPROM ranges from maternal and neonatal mortality and morbidity to national economic loss due to drug expense, hospitalization, absence from the workplace, and expense to the health professionals[21]. Despite its contribution to maternal and neonatal mortality and morbidity, very few studies have addressed PPROM and its associated management and related pregnancy outcomes in Ethiopia. Therefore, this study was conducted to assess the prevalence and associated factors of PPROM among all preterm pregnancies managed in Hiwot Fana Comprehensive Specialized University Hospital, Eastern Ethiopia.

MATERIAL AND METHODS

Study design, and area

A hospital based retrospective cross-sectional study was conducted at the department of obstetrics of Hiwot Fana Comprehensive Specialized University Hospital (HFCSUH). Hiwot Fana Comprehensive Specialized University Hospital is a tertiary academic center of Haramaya University found in Harar town serving as a comprehensive referral center for more than 5.8 million population in eastern Ethiopia. As a comprehensive hospital, it plays a major role in providing teaching, research, and community service, including a well-established neonatal intensive care unit. During the study period, the department was run by 14 consultants, 28 residents, and 33 midwives.

Study participants

In this retrospective study, all preterm pregnant women who were admitted from May 2019 to September 2020 were included. On the other hand, all preterm pregnancies with incomplete data, and unknown weeks of gestation were excluded from the study.

Sample size determination and sampling technique

Double population proportion formula was used and sample size was determined using Epi Info version 7 stat Cal by considering the proportion of women with a history of urinary tract infection (UTI) in pregnancy than those who did not have UTI (AOR = 2.62, 95% Cl = 1.32–5.19), in a previous

study done in Debre Tabor General Hospital[13] and the following assumptions was considered: 95% confidence level, 80% power, 1:1 ratio and 15% non-response rate. The final minimum required sample size was determined to be 449. A total of 1346 preterm deliveries were identified during the admission period (from May 2019 to September 2020) and 449 participants were selected using systematic random sampling technique. When the total population for the admission period (1346) was divided by the sample size (449), the sample interval (K) was found 3. The first study participant was selected randomly between one and K using the lottery method, and the next subject was selected in accordance with K value until the sample size was reached.

Data collection methods

Data was collected using pretested structured data extraction checklist by trained senior midwives and two resident doctors under the supervision of a senior resident. The data extraction checklist was developed after reviewing relevant literature and contextualized to fit the research objective. The checklist was designed to obtain data related to socio-demographic variables (maternal age, marital status, residence, occupation, and educational status), obstetric variables (prenatal care, vaginal bleeding, gravidity, parity, gestational age, history of abortion and PPROM), maternal medical, fetal, and health-related factors (urinary tract infections, mid-upper arm circumference, (pre)eclampsia, diabetes mellitus, malpresentation, intrauterine growth restriction, ancephaly, number of fetus, and anemia).

Quality assurance and management

A one-day training was given to the data collectors before the actual data collection. In addition, the data abstraction checklist was pre-tested on 5% of the sample size in Jugal Hospital. Completeness of information and clarity of the collected data were checked on a daily basis. Data was double entered independently by two individuals.

Data processing and analysis

Data were coded, cleaned, and entered in Epi-Data 3.1 (Epi data Association, Odense Denmark) and exported to SPSS 25 (IBM Corporation, USA) for analysis. The results were reported as frequency and percentages for categorical variables and using mean (±SD) for normally distributed continuous variables. Bivariable and multivariable logistic regression was fitted to identify factors associated with PPROM. Association was described using an adjusted odds ratio (AOR) along with their corresponding 95% confidence interval (CI). Associations with a p-value<0.05 in the multivariable regression were considered statistically significant.

Ethical considerations

Ethical clearance was obtained from the Institutional Health Research Ethics Review Committee of Haramaya University College of Health and Medical Sciences (Ref No: IHRERC/146/2021). The purpose and objective of the study were explained to the hospital administrative body and written informed consent was obtained from the chief clinical director of the hospital and head of the labor ward before the data collection. Confidentiality of information was kept throughout the study through the use of anonymous identifiers. The study was carried out according to the Declaration of Helsinki.

RESULTS

Socio-demographic characteristics

A total of 449 preterm pregnant women were enrolled in the study. The mean age of participants was 28.9 ±1.12, ranging from 16 to 40 years. The majority of the study participants were married (97.3%), housewives 374 (83.3%), and Oromo 365 (81.3%). Half of them were urban residents 228 (50.8%) (Table 1).

Table 1: Sociodemographic characteristic of preterm pregnant women admitted in Hiwot Fana Comprehensive Specialized University Hospital, Eastern Ethiopia, (n=449).

Variable	Categories	Frequency (n)	Percentage (%)
Age in years	<18	24	5.3
	18-35	410	91.7
	>35	15	3.3
Residence	Urban	228	50.8
	Rural	221	49.2
Ethnicity	Oromo	365	81.3
	Harari	73	16.3
	Amhara	8	1.8
	Somali	3	0.7
Occupation	House wife	374	83.3
	Marchant	45	10.0
	Government employee	15	3.3
	Civil servant	3	0.7
	Others	12+3	2.7+0.7
Marital status	Single	9	2.0
	Married	437	97.3
	others	3+9	0.7+2
Women's educational Status	No formal education	220	49.0
	Primary school	154	34.3
	Secondary school	45	10.0
	Higher education	30	6.7

Reasons for Admission

Nearly one-fifth (22%) of the women were admitted for the indications of preterm labor followed by preeclampsia 74 (16.5%), PPROM 64 (14.3%), and APH 63 (14%) (Table 2).

Table 2: Reasons for admission of preterm pregnant women in Hiwot Fana Comprehensive Specialized University Hospital, Eastern Ethiopia, (n = 449).

Indication for admission	Frequency (n)	Percent (%)
Preeclampsia/eclampsia	74	16.5
APH	63	14
Oligohydramnios	14	3.1
PPROM	64	14.3
Preterm labor	99	22
Diabetes mellitus	4	0.9
Malpresentation	20	4.5
IUGR	5	1.1
Anencephaly /hydrocephalus	21	4.7
Non-reassuring biophysical profile	8	1.8
Twin pregnancy	31	6.9
Severe anemia	10	2.2
Intrauterine fetal death	19	4.2
Others	17	3.8
Total	449	100

About 155 (35.0%) were nulliparous and two third of them 300 (66.8%) had ANC follow up. The majority of the pregnancies were singleton 405 (90.2%) (Table 3).

Table 3: Obstetric profile of women admitted with preterm pregnancy in Hiwot Fana Comprehensive Specialized University Hospital, Eastern Ethiopia, (n=449).

Variable	Categories	Frequency (n)	Percentage (%)
Gravidity	I	144	32.1
	II-IV	205	45.7
	>IV	100	22.3
Parity	Nullipara	155	34.5
	Primipara	86	19.2
	II-IV	125	27.8
	>IV	83	18.5
History of abortion	Yes	53	11.8
	No	396	88.2
ANC	Yes	300	66.8
	No	149	33.2
Number of ANC visit	No visit	149	33.2
	One	29	9.7
	Two	131	43.7
	> two	140	46.7
Number of fetus	Singleton	405	90.2
	Multiple	44	9.8

The burden of PPROM and associated factors

A total of 64 (14.3%; 95% CI 11.1-17.5) of the women had PPROM, all of whom were managed expectantly. Bivariable and multivariable logistic regressions were done to assess the factors associated with PPROM. In bivariable analysis, gravidity, residence, history of PROM, history of abortion, vaginal bleeding, maternal nutritional status, and urinary tract infections (UTI) were identified as potential candidate variables to be considered in the multivariable analysis by setting a p-value <0.25. In the final multivariable logistic regression model, PPROM was found to be associated with history of abortion, vaginal bleeding, maternal nutritional status, and UTI. The odds of having PPROM were 6 times higher (AOR=6.33; 95% CI:3.26-12.29, P=0.001) among women with UTI as compared to women without UTI. Similarly, the odds of PPROM among women with vaginal bleeding were almost 3 times higher (AOR=2.62;95% CI:1.23-5.57, P=0.012) compared with their counterparts. The odds of having PPROM was 3 times higher (AOR= 3.07,95% CI:1.33-7.06, P=0.008) among women with a history of abortion. The odds of developing PPROM were 7 times higher (AOR=7.06; 95% CI:4.02-12.43, P=0.001) among women with undernutrition (MUAC <23) compared with their counterparts (Table 4).

Table 4: Factors associated with PPROM among women admitted with preterm pregnancy in Hiwot Fana Comprehensive Specialized University Hospital, Eastern Ethiopia, (n=449).

Variable	Categories	PPROM		COR (95% CI)	P-value	AOR (95% CI)	P-value
		Yes	No				
Gravidity	1	16(11.1%)	128(88.9%)	1		1	
	2-4	31(15.1%)	174(84.9%)	1.43 (0.75-2.72)	0.389	1.37 (0.72-2.62)	0.122
	>4	17(17.0%)	83(83.0%)	1.64 (0.78-3.42)	0.282	1.82 (0.86-3.86)	
Residence	Urban	38(16.7%)	190(83.3%)	1		1	
	Rural	26(11.8%)	195(88.2%)	0.67 (0.39-1.14)	0.139	0.63 (0.34-1.09)	0.139
History of abortion	No	48(12.1%)	348(87.9%)	1		1	
	Yes	16(30.2%)	37(69.8%)	3.14 (1.62-6.06)	0.001	3.07 (1.33-7.06)	0.008*
Previous PROM	No	53(12.6%)	368(87.4%)	1		1	
	Yes	11(39.3%)	17(60.7%)	4.49 (1.99-10.2)	0.001	2.76 (0.98-7.72)	0.053
Vaginal bleeding	No	47(12.2%)	337(87.8%)	1		1	
	Yes	17(26.2%)	48(73.8%)	2.54 (1.35-4.78)	0.004	2.62 (1.23-5.57)	0.012*
UTI	No	31(8.2%)	345(91.8%)	1		1	
	Yes	33(45.2%)	40(54.8%)	9.18(5.09-16.55)	0.001	6.33(3.26-12.29)	0.001*
MUAC	<23cm	38(36.5%)	66(63.5%)	7.06(4.02-12.43)	0.001	7.18(3.71-13.91)	0.001*
	≥23 cm	26(7.5%)	319(92.5%)	1		1	

Note: *p<0.05 considered as statistically significant, COR, crude odds ratio; AOR, adjusted odds ratio; CI, Confidence interval

DISCUSSION

In this study, we assessed the burden of PPROM and its associated factors among pre-term pregnant women admitted to a university hospital in eastern Ethiopia. In our sample, we found that one in seven preterm women had PPROM. Preterm PROM was more likely among women with urinary tract infection, history of abortion, vaginal bleeding, and undernutrition. Our finding is comparable with the finding from Debre Tabor General Hospital, North West Ethiopia (13.67%)[13]. In our study, the prevalence of PPROM was higher than the global prevalence of (1% - 3%)[22] and other studies in Rio Grande Brazil (3.1%)[9], in India (2.01% - 2.2%) [10,23], in Nigeria (3.3%)[11], in Uganda (7.5%)[6] and southern Ethiopia (6.6%)[12]. This might be due to the differences in the study population; in this study, data was collected from a selected high-risk population which may increase the magnitude of PPROM. On the other hand, this finding is lower than the study findings in Jiangsu Province Hospital in China (19.2%)[24]. The difference could be attributed to the time gap between the studies and the absence of behavioral risk factors for PPROM such as smoking, cocaine use, and alcohol consumption in the present study.

We found that PPROM was associated with UTI, which is consistent with previous reports from Debre Tabor, Ethiopia (13), and northeastern India,[23]. This might be linked with elevations in the inflammatory mediators such as prostaglandins, cytokines, and proteinases in the local tissue which plays a causative role in the disruption of fetal membrane integrity triggering uterine contractility as part of the physiologic defense mechanism[25]. We also found that undernutrition (MUAC <23 cm) was significantly associated with PPROM, a finding consistent with studies from Debre Tabor, northern Ethiopia[13]. Nutritional deficiency particularly micronutrients deficiencies such as vitamin C or

ascorbic acid affects collagen formation which protects the body against degenerative processes resulting from oxidative stress leading to collagen weakness and capillary hemorrhage. Similarly, women with vaginal bleeding were more likely to develop PPROM compared to their counterparts. This finding was consistent with the study conducted at Debre Tabor General Hospital[13]. This might be related to thrombin release from the decidual cells as a result of decidual hemorrhage which might result in tissue necrosis and degradation of the extracellular matrix[26].

We also found that history of abortion was found to be significantly associated with PPROM. The likelihood of having PPROM among mothers who have a history of abortion was three times higher than compared with those who did not have a history of abortion. Our study was supported by previous reports from China[27], rural Uganda[6], Tigray, northern Ethiopia[16], and southern Ethiopia[12]. This might be related to the weakening of the membranes secondary to the trauma that lies on the uterine wall. In addition, it might be related to the tendency for increased systemic inflammation and stimulation of the infection pathway or vascular complications which raised secondary to the abortion[20].

The current study has to be interpreted with some limitations. First, the study is institution-based and focused on the high-risk population who might affect the actual prevalence of PPROM in the study area as well as in the country. Second, we did not collect data on some variables such as interpregnancy interval, BMI and income which may be associated with PPROM because of incomplete information in the medical records.

CONCLUSIONS

Overall, one in seven preterm women included in our study had PPROM. Preterm PROM was found to be significantly associated with urinary tract infections, vaginal bleeding, maternal nutrition, and history of abortion. Hence, improving the nutritional statuses of pregnant women including pre-conception nutrition and early screening and treatments of UTIs is recommended to reduce the risk of PPROM. Further study on the appropriateness of management of women with PPROM and related pregnancy outcomes is essential for designing tailored recommendations.

DECLARATIONS

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Availability of Data and Materials

All relevant data are included in this manuscript. However, the datasets used or analyzed during the current study available from the corresponding author on reasonable request.

Conflict of interests

The authors declare no conflict of interest.

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Contribution of authors

ST conceived the study, supervised the data collection, run the statistical analysis and interpretation, and drafted the manuscript. TG and AKT supervised the overall research process. TG, AKT, AA, and MA participated in the design of the study, data analysis, interpretation, and drafting of the manuscript. All authors have approved the final manuscript for submission and agreed to be accountable for the entire work of this research.

Abbreviations

ACOG: Americans College of Obstetricians and Gynedologist,

AOR: Adjusted odds ratio, APH: Antepartum

Hemorrhage,
COR: Crud odds ratio,
HFCSUH: Hiwot Fana Comprehensive Specialized University Hospital,
IUGR: Intrauterine Growth Restriction,
PPROM: Preterm Premature Rupture of the Membrane,
PROM: Premature Rupture of of the Membrane,
SPSS: Statistical Package for Social Science,
MUAC: Mid Upper Arm Circumference,
UTI: Urinary Tract Infection

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TREND ANALYSIS OF FROZEN EMBRYO TRANSFER AT ALHIKMAH FERTILITY CENTER, ADDIS ABABA, ETHIOPIA

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ABSTRACT

BACKGROUND: In recent years, the use of frozen embryo transfers in Artificial reproductive technology has gradually increased, owing to improvements in laboratory techniques such as vitrification and blastocyst culture making pregnancy rates approaching those of fresh transfer cycles.

OBJECTIVE: The objective of this study is to determine the pregnancy rate after frozen embryo transfer, analyze the clinical factors that can potentially influence the result of pregnancy and identify patients who could benefit from this approach.

METHODS: A retrospective cross sectional study design was used to select patients that have undergone frozen embryo transfer from January 1, 2019- March 31, 2022 at Alhikmah fertility center, Addis Ababa, Ethiopia. Baseline data and pregnancy rate was collected, computed with SPSS version 24 for statistical associations and presented with tables. The primary outcome was a positive pregnancy test defined as serum β-HCG level of >10mIU/ml.

RESULT: A total of 180 frozen embryo transfers were done for 128 women over the study period and the pregnancy rate was 26.6%. The mean age of the patients was 31.88(± 5.04). Majority (45.3%) had tubal factor infertility. ≥ 13(median) oocytes were collected for 53.9%. A freeze-all technique was used in 46% of the patients and the rest had extra embryos. Age of the patient <35 and retrieval of oocytes above median had relation with positive pregnancy outcome. More importantly, freezing for risk of hyperstimulation and transfer of day 5embryos had a significant association with pregnancy with p-value <0.05.

CONCLUSION: From this study, we've seen promising pregnancy rate after frozen embryo transfer in patients with age group <35 and those having ≥13 oocyte. In addition, we can conclude that freezing for women at risk of hyperstimulation and transferring day 5embryos leads to a positive pregnancy result. However, since this is a retrospective study, we suggest a prospective comparative study to be done in the future for better recommendation.

KEYWORDS: Frozen embryo transfer, pregnancy rate, outcome predictors, assisted reproductive technology

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INTRODUCTION

Assisted reproductive technology (ART) has evolved rapidly and its utilization has increased over the years. Globally, the number of initiated and frozen embryo transfer (FET) cycles has increased by 4.8% and 46%, respectively in the years 2010 to 2015; the delivery rate after IVF/ICSI remained relatively constant over the five year period (20% vs. 19.2%) whereas delivery rate after FET increased by 16% (20.7% vs., 24.8%).[1, 2].

Similarly, the African registry (ANARA) released reports of ART utilization from 13 countries in 2013 and 18 countries in 2017, but only with 10% increment of initiated cycles. Nevertheless, utilization of FET and PR from FET has increased from 17.2% to 24.2% and 27.6% to 37.9%, from 2013 to 2017, respectively[3, 4].

In Ethiopia, there are currently few private and one public centers providing ART services. The ART cycles has shown an increment of 77% and FET cycles by 94% from 2016-2022 as seen from the report in our center.

Reasons why FET success was lower in the past:

Typically, when FET was performed, the embryos that were frozen were those that were not chosen for the initial fresh ET, since the "best" embryos are already chosen for the initial transfer. As in the case of fresh embryo transfer, embryo quality has a profound effect on the chance for pregnancy.[5, 6]

The other reason is the method to freeze embryos underwent a big change over the years. In the past, embryos were frozen by a slow method. More recently, embryos are frozen by a fast method known as vitrification with better survival rates >90% and PR[5, 6].

So far several studies have shown pregnancy rate after FET of 27.8-66 %[4, 7-11] which is actually comparable to the pregnancy rate after fresh embryo transfer (33-64.6%)[4, 7-11]

Currently, researches are focusing on whether the overall IVF population could benefit from a freeze-all strategy, which yields improved reproductive outcomes especially in women with increased risk of ovarian hyperstimulation syndrome[7, 8, 12, 13, 14, 15].

The pregnancy outcomes after the FET is known to be dependent on multiple clinical factors like age of the patient, FSH level, number of oocytes, reason for freezing, day of embryo[4, 7, 8, 15, 16, 17]

Additionally FET is beneficial for patients with cancer to preserve their fertility, to do PGD test, for women having uterine problem and also for women with high progesterone[24-26].

As previously shown, the success of FET has improved over the years and its utilization has increased worldwide. Thus, the objective of this study is to assess the PR and clinical factors that can influence PR after FET in our center; and to compare our results with available literature. This study is hoped to answer the following questions.

What is the PR after FET?

What are the clinical factors associated with pregnancy after FET?

Which patients can benefit from FET?

METHODS

Study setting, period, and design

This was a retrospective cross sectional study of all patients that have undergone FET from January1, 2019-March 31, 2022. The study is conducted at Alhikmah fertility center located in Addis Ababa, Ethiopia which is the first private IVF center in the country. The center established in 2016, provides advanced ART services and has served >5000 patients till present.

Study variables

Dependent variables: Positive pregnancy test defined as serum β-HCG level of >10mIU/ml determined 10-12 days after FET. The pregnancy rate was determined as a ratio between the number of positive β-HCG tests and the total number of frozen embryo transfers.

Independent variables: age, BMI, FSH, number of oocytes, reason for freezing, day of embryo

Procedures

Ovarian stimulation was achieved using either recombinant FSH and LH (Menopure) or

recombinant FSH (Gonal F). The patients underwent pituitary desensitization using either GnRH agonist or antagonist protocol. After giving HCG trigger, egg collection was conducted. After that, embryos were cryopreserved by vitrification method. At the start of new menstrual cycle, patients received exogenous estrogen therapy for endometrial preparation before the embryo transfer. Endometrial thickness was documented by transvaginal ultrasonography. When endometrial thickness had reached 8mm or more, dyhydrogestrone were commenced. Embryos were transferred using a Labotect or Wallace catheter.

RESULT

1. Baseline characteristics

The present study was conducted on 128 patients who had undergone FET. Table 1 gives an overview of the different characteristics of the patients. Among the patients 87(68%) were below the age of 35. The minimum age was 21 and the maximum was 42 with the mean age being 31.88(± 5.04). A quarter of patients had previous pregnancy of which 14% were with IVF. Majority (45.3%) of patients had tubal factor infertility.

Table1: Baseline characteristic of women undergoing FET at Alhikmah fertility center, Jan 1, 2019- Mar 31, 2022

Characteristics		No	%
Age	<35	87	68
	≥35	41	32
Infertility type	Primary	114	89.1
	Secondary	14	10.9
	<18.3	9	7
BMI(kg/m2)	18.3-24.9	74	57.8
	25-29.9	40	31.3
	30-34.9	5	3.9
	Tubal	58	45.3
Cause of infertility	Male	43	33.6
	PCOS	7	5.5
	Combined	8	6.3
	Unexplained	10	7.8
	POF	2	1.6
FSH level(miu/ml)	<10	114	89.1
	≥10	14	10.9

2. Clinical characteristics

The long protocol was used for 53.6% of patients. 60.2% had a good response with 4-17 oocytes collected. Freeze-all strategy was followed for 59(46%) cases; majority 42(71.1%) was for women at risk of hyperstimulation. 101(78.9%) of embryos were frozen at blastocyst stage.

Table 2: Clinical characteristic of patients at Alhikmah fertility center, Jan 1, 2019- Mar 31, 2022

Characteristics		No	%
Stimulation protocol	Agonist	69	53.9
	Antagonist	59	46.1
	<4	8	6.3
No of oocytes collected	<4	8	6.3
	4-17	77	60.2
	≥18	43	33.6
Reason of freezing	Extra embryos	69	53.9
	Risk of OHSS	42	32.8
	High progesterone	13	10.2
	Endometrial mass	4	3.1
Day of embryos	Day 3	27	21.1
	Day 5	101	78.9
No of embryos transferred	1	23	18
	2	69	53.9
	3	36	28.1

3. Magnitude of positive pregnancy and influencing factors

We also performed forward logistic regression for all clinical and embryological factors that we assumed to have an influence on β-HCG result. Out of the 128 patients for whom FET was done, 34(26.6%) of them had positive pregnancy test. From the different clinical factors, significant associations were found using binary logistic regression tests between pregnancy rate and age of the patient, oocyte above median, freezing for risk of hyperstimulation and Day 5 embryos. But no association was found with BMI, FSH level, cause of infertility, stimulation protocol and number of embryos transferred.

Table3. The univariate statistical analysis of clinical factors influencing the positive pregnancy in frozen embryo transfer at Alhikmah fertility center, Jan 1, 2019- Mar 31, 2022

Characteristics	Negative (n=94)	Positive(n=34)	P-value
Age mean	32.47(± 5.12)	30.24(±4.49)	0.027*
Age			
<35	59(62.8%)	28(82.4%)	0.036*
>35	35(37.2%)	6(17.6%)	
BMI(kg/m2)			
<18.3	6(6.4%)	3(8.8%)	0.739
18.4-24.9	57(60.6%)	17(50%)	
25-29.9	27(28.7%)	13(38.2%)	
30-34.9	4(4.3%)	1(2.9%)	
FSH			
<10miu/ml	82(87.2%)	32(94.1%)	0.274
≥10miu/ml	12(12.8%)	2(5.9%)	
Number of oocytes retrieved, median	11.0(2.0,20.0)	16.0(9.0,25.0)	0.023*
Stimulation protocol			
Agonist	51(54.3%)	18(52.9%)	0.896
Antagonist	43(45.7%)	16(47.1%)	
Reason of freezing			
Extra embryo	58(61.7%)	11(32.4%)	0.031*
Risk of OHSS	24(25.5%)	18(52.9%)	
High progesterone	10(10.6%)	3(8.8%)	
Endometrial mass	2(2.1%)	2(5.9%)	
No of embryo transferred			
1	21(22.3%)	2(5.9%)	0.101
2	48(51%)	21(61.8%)	
3	25(26.5%)	11(32.4%)	
Day of embryos			
Day 3	24(25.5%)	3(8.8%)	0.014*
Day 5	70(74.5%)	31(91.2%)	

Note: *P<0.05

4. Multivariable regression of factors associated with pregnancy result

A standard multiple regression was performed to assess variables associated with pregnancy to control confounders. It was found out that women for whom FET was done risk of hyperstimulation was 15 times more likely to get pregnant than women who had FET for other reason (AOR; 15.45 95% CI 1.4-170.56, P-0.025). Patients who had Day 5 embryos transferred were 4.54 times more likely to get pregnant compared to those with day 3 embryo transfer (AOR 4.54 95% CI 0.93- 22.09, p-0.03).

Table 4: Multivariable logistic regression test for associated factors with pregnancy at Alhikmah fertility center, Jan 1, 2019- Mar 31, 2022

Characteristics	AOR	P-value	95% CI
Age			
<35	0.43	0.138	0.148
≥35			1.302
Number of oocytes retrieved, median	1.17	0.788	0.372 3.688
Reason of freezing Extra embryo Risk of OHSS	15.45	0.025	1.400 170.562
High progesterone	3.83	0.3	0.29- 50.34
Endometrial mass	8.42	0.11	0.59- 118.6
Day of embryos			
Day 3			
Day 5	4.54	0.038	0.936 22.095

The present retrospective study was carried out to provide a better understanding of the clinical factors in predicting the pregnancy rate of frozen-thawed embryo transfers using data from frozen embryo transfer cycles performed at Alhikmah fertility center, Addis Ababa, Ethiopia. In this review, we've found the overall PR from FET is 26.6%.

Our PR shows comparable outcome as in 27.8%[11], 25.8%[18], 28.1%[20] and 27.6%[23] but a lower value when compared with studies who had PR of 37.9% [4], 66%[7], 64%[8], 39%[9], 62.3%[10], 44%[21], 63%[15]. This could be due to the low number of subjects in our study group.

It is well known that age is a significant factor in the success of IVF whether in fresh or frozen transfer cycles.[16, 19, 22, 23] In our study, the mean age of the patients was 31.88(± 5.04) comparable with most other studies[16, 18, 19, 20, 29]. Furthermore, 82.4% of our clients below the age 35 were pregnant compared to 73.5%, Dyer et al[4], 66%, Chen et a[17] and 57.7% Eftekhar et al[16].

The PR in those above 40 years was 2.9% in this study, compared to the 15.4% Liu et al[27] 7.7% [20], 7.5%[19] and nil[23]. In conclusion age is a significant factor associated with positive pregnancy with p-value<0.05 as shown in this study as well in others[4, 7, 16, 18, 19, 23].

FSH is one of the tests that predict ovarian response to stimulation, and thus increase the chance of pregnancy. In those women with FSH of > 10miu/ml, PR was 56.3% Eftekhar et al[16], 17.3% Roque et al[28], 15.4%, Liu et al[27], and 5.9%, in our study. In a study done by Ahmed et al[29] the clinical pregnancy was significantly higher in women with FSH levels less than 9 IU/L compared with those with an FSH level of 9 IU/L or more. In another investigation, Eftekher et al[16] reported inverse correlation between basal serum FSH levels before fresh IVF/ICSI cycle with pregnancy outcome in FET cycles unlike this study where no association was found. This could again be due to the smaller sample size than the other studies and also the different laboratory calibrations might have an impact on the Regarding the relationship between the type of protocol used and pregnancy, no significant association was found in this study as well in others.[16, 21] but Mahnaz et al[20] found that the implantation rate in women stimulated with gonadotrophin releasing hormone agonist long protocol was higher than that in the patients stimulated with antagonist protocol ($p < 0.05$).

The other clinical factor influencing PR is the number of oocytes retrieved. A number of studies showed that a higher number of oocytes, all above 11 oocytes, are significantly associated with positive pregnancy.[8, 9, 15] In this study, the median number of oocytes found was 13, with PR in the group above the median 70.5% compared to 39% and 87.5%, Aflatoonian et al[9], Shapiro et al[8], 63.1%[15] respectively.

However in one study, Mahnaz et al[20] found out that women with a lower number of retrieved oocytes had more chance to have a positive β-HCG result, meaning that with increasing number of oocytes, the chance of pregnancy decreases. This

suggests that with increasing number of oocytes, the quality may reduce. But this was shown in any other researches.

In < 4 oocytes collected, PR was 17.3%, Roque et al [28], 9.6% Liu et al [27] and 2.9% in this study. The number oocytes collected is significantly associated with positive outcome with p-value of <0.05.

There are a number of reasons for freezing of embryos, the commonest being presence of extra embryos and risk of hyperstimulation; PR was highest, 52.9%, recorded in those for whom embryo was frozen for risk of hyperstimulation with p-value of 0.03 even after controlling for possible confounders with multiple regression analysis. This was also shown in one study where PR was 63.1% in women with risk of hyperstimulation after FET, Absalan et al[15]. However, in one retrospective study Eftekhar et al[16], PR didn't differ between FET done for risk of hyperstimulation and extra embryos, 54.5% vs. 50.2%, respectively. Nevertheless, the increased PR rate was basically seen in many studies that led to the conclusion that freezing should be reserved for this category of patients.[7, 8, 11, 14 and 15].

There is a controversy among studies in the relationship between the number of embryos transferred and pregnancy outcome. Some researchers have reported a higher pregnancy rate with greater number of embryos transferred, and other studies fail this relationship. Salumets et al [18] indicated that the pregnancy (positive hCG) and clinical pregnancy rates were significantly higher after Double Frozen embryo transfer than they were after Single Frozen embryo transfer. However this association was not seen, in this study as well in others[16, 20, 23].

Regarding the day of embryos for transfer, many researches showed a positive outcome with transfer of blastocysts rather than day 3 embryos.[5, 6] In this study, with 78.9% of embryos transferred on day 5 the PR was 91.2% which was comparable to 85.7%, Shapiro et al[8] which showed significant association with p-value of <0.05. This shows that there is better PR with transfer of embryos at blastocyst stage.

CONCLUSION

There a number of factors affecting the success of IVF/FET. From this study, we've seen promising pregnancy rate after frozen embryo transfer in patients with age group <35and those having ≥13 oocyte. In addition we can conclude that freezing for women at risk of hyperstimulation and transferring day 5 embryo leads to a positive pregnancy. However, since this is a retrospective study, we suggest a prospective comparative study to be done in the future for better recommendation.

DECELERATIONS

Strength and limitation of the study

This is the first study done in Ethiopia for the objective of assessing the PR after FET which can serve as a baseline study to lay the foundation for further researches. The study has some limitations. The first is the small sample size which makes it difficult to create stronger associations. Additionally, the study being a retrospective cross sectional study, it is hard to generalize the result to the whole ART population.

Acknowledgement

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Abbreviation

ANARA- African Network and Registry for Assisted Reproductive Technology
ART- Assisted Reproductive Technology
BMI- Body Mass Index
ET-Embryo Transfer
FET- Frozen Embryo Transfer
FSH- Follicular Stimulating Hormone
GnRH- Gonadotropin Releasing Hormone
HCG- Human Chorionic Gonadotropin
ICMART-International Committee for Monitoring Assisted Reproductive Technologies
ICSI- Intracytoplasmic Sperm Injection
IVF- In vitro Fertilization
OHSS- Ovarian Hyper stimulation Syndrome

PCOS- Polycystic Ovarian Syndrome
POF- Premature Ovarian Failure
PR- Pregnancy rate

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COMPLETE CONGENITAL HEART BLOCK IN A NEWBORN ASSOCIATED WITH MATERNAL SYSTEMIC LUPUS ERYTHEMATOSUS: A CASE REPORT

Haile Gilcha, MD[1], Solyana Henok[2]

ABSTRACT

BACKGROUND: Complete Congenital Heart Block (CCHB) is an uncommon life-threatening disease of the newborn which leads to significant neonatal morbidity and mortality. It is usually diagnosed early in life and highly associated with maternal autoimmune and connective tissue disorders. CCHB frequently presents with bradycardia which can be diagnosed by fetal electrocardiogram.

RESULTS: This is a case report of a male neonate born with a third-degree heart block to a mother with high Ro/SSA titer.

CONCLUSION: Neonates born to women with SLE have an increased risk of CHD, and an increased risk of having a CHD repair procedure later. It is important to diagnose, treat or refer neonates with CCHB early for definite management with pacemaker insertion as it helps for a better prognosis and prevention of associated complications, but this is not often possible in low resource settings lie Ethiopia.

KEYWORDS: Congenital Heart Block, Systemic Lupus Erythematosus, Bradycardia, SS-A/Ro Antibodies

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INTRODUCTION

Complete congenital heart block is uncommon and life threatening disorder which is estimated to occur in about 1 in 20,000 live births in the US[1]elsewhere its only discussed in case series[2]. It has a poor prognosis especially when associated with congenital heart defects[1,3]. It commonly results from a transplacental transfer of maternal anti-Ro/SSA and/or Anti-La/SSB antibodies which can have an effect on the fetal heart by provoking fetal conduction disturbances[4] and in mothers with autoimmune hypothyroidism. The incidence differs among the different anti-bodies; 2% in anti-Ro/SSA positive women, 3% in presence of both anti-Ro/SSA and anti-La/SSB[5]. The risk is much higher if the mother already has a previous child with Neonatal lupus erythematosus or has hypothyroidism due to thyroid autoantibodies that test positive for anti-Ro/SSA antibodies[1,2].

THE CASE

A 35 years old GIIIAII mother presented to our hospital's Obstetrics OPD for antenatal follow-up 3 years ago at 26 weeks of gestation. She had a history of 2 prior early first trimester spontaneous abortions at 5 weeks and 8 weeks of gestation respectively. 1 year preceding the third pregnancy she was diagnosed with Autoimmune Hypothyroidism (TSH=10.02, Free T3=3, Free T4=1.14, TPHA negative) and was started on Thyroxine 100mcg on 5 days and 150mcg on 2 days per week during workup to know the cause of recurrent miscarriages. She had regular ANC follow-up during the 3rd pregnancy. She has taken prenatal vitamins and 2 doses of TT vaccine. She was told to have dietary and life style modifications after her 2 hours OGTT (FBS=91,2 hrs RBS=146),results were consistent with Gestational Diabetes. A third trimester ultrasound at around 6 months of gestation showed a fetal heart beat in the range of 52-60 beats/min with no visible structural heart defect. She had close antenatal monitoring and had an elective c-section done at 38+6 weeks of gestation for the indication of severe fetal bradycardia secondary to ?conduction defects. She delivered a male neonate weighing 3700 gm with an APGAR score of 8 and 9 at the 1st and 5th minute respectively. Post delivery baby didn't need NICU admission, was stable with a heart rate of 58-60 beats/min and was by mother's side. Upon discharge baby was referred to a pediatrics cardiac center where the pertinent finding from investigations done was on ECG (Fig 1) and echocardiography which showed a complete heart block and Echocardiography revealed a small PDA 3-5mm, with moderate MR and mild TR. As part of workup for the cause of the congenital heart block maternal anti-Ro and anti-La antibodies were sent abroad which showed a higher value for the first. The baby had close monitoring at a pediatrics cardiac center and had a permanent pacemaker insertion and PDA ligation done at the age of 1 year.

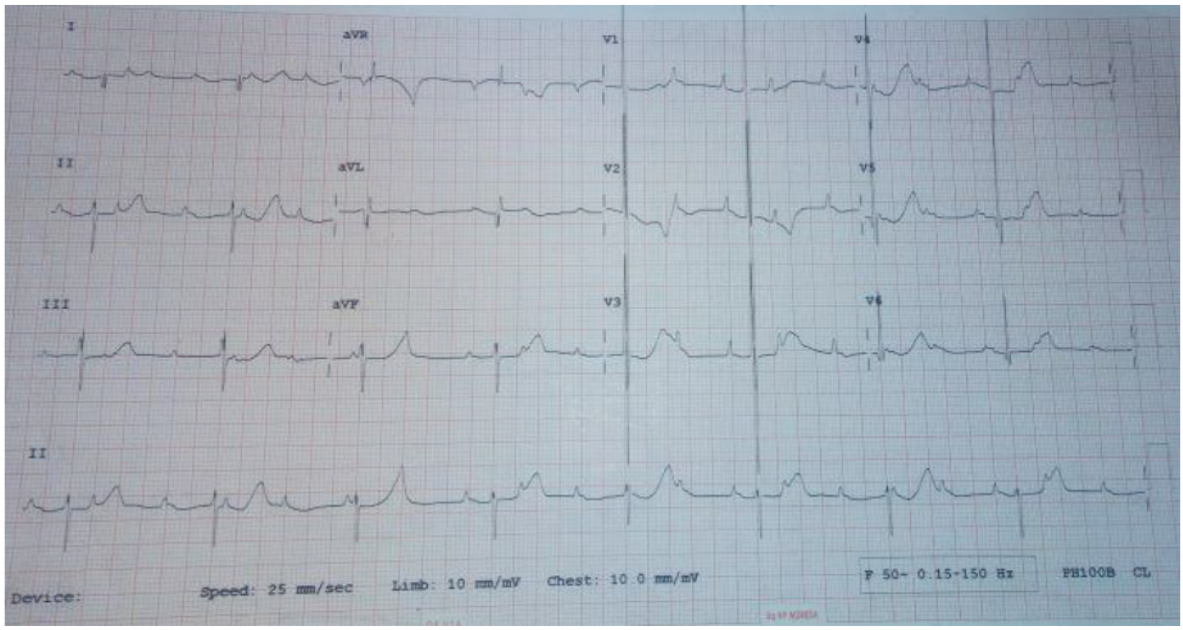

Figure 1: ECG showing a 3rd degree AV block

Complete congenital heart block is a potentially fatal condition usually occurring in association with autoimmune antibodies in the mother that cross the placenta and lead to conduction defects by involving the atrioventricular tissues of the fetal heart due to inflammatory changes or by interfering with the ion channel leading to fibrosis[5,6]. Fetal congenital heart block (CHB) is the most common outcome of pregnancies related to Systemic Lupus Erythematosus; SLE .It is systemic autoimmune disease, with multisystemic involvement in which the clinical manifestations are exaggerated during pregnancy due to high levels of estrogen[6].Anti-nuclear antibody (ANA) is the most sensitive antibody, and anti-ds DNA antibodies and anti-smith antibodies are more specific for the diagnosis of SLE[3]. There are also non-specific antibody subtypes targeted against nuclear material like antibodies to Ro (SSA) and La (SSB). Our patient had remarkable history of multiple spontaneous abortions, autoimmune hypothyroidism in the past and was diagnosed with high levels of anti- Ro antibody which both go for SLE.

Congenital heart block can be identified in utero between 18 and 28 weeks of gestation during routine antenatal checkups and evaluating by fetal echocardiography for the presence of fetal bradycardia can help detect ongoing conduction defects and complications like hydrops fetalis(1). Antenatal visit at 24 weeks in our patient reveled fetal bradycardia ranging from 52-60 beats per minute which prompted an assessment with fetal echocardiography which confirmed the diagnosis of complete heart block in the fetus. Unlike many reported cases of CCHB with concomitant heart defects, no major structural heart defect was detected antenatal in our case.

If diagnosed in utero in a mother who tested positive for SLE autoantibodies, management mainly comprises organized and timely monitoring for heart block and treating the first known heart block with steroids, sympathomimetics, plasmapheresis and fetal pacing depending on the degree of block[3]. In our case the diagnosis of maternal lupus was made postnatal so no management was initiated during pregnancy and she delivered a healthy child at term.

Early pacemaker insertion for children presenting with symptoms during the neonatal period helps to prevent a sudden cardiac death and improve the quality of life[3,6].In our case pacemaker insertion was delayed until 1 year after birth since the baby was stable and had no complication.. The patient is now on regular follow-up with a pediatric cardiothoracic surgeon.

CONCLUSION

Pregnancy associated with SLE is rare and may be complicated by severe outcomes. Fetal complete heart block is one of the most commonly encountered outcomes and is diagnosed with the help of a fetal echocardiogram. Patients who are at high risk of developing CHB warrant a frequent surveillance at 2nd trimester because initiation of steroids may improve outcome. The delivery should be planned in a tertiary care centre where pacemaker placement facility is available, when needed. Because there are only very few studies available, the authors recommend more studies to be done on the importance of steroid initiation on improving outcome of complete congenital heart block.

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