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PERINATAL OUTCOME OF EARLY PRETERM STAGE II IUGR AT TWO HOSPITALS IN ADDIS ABABA: A RETROSPECTIVE CROSS SECTIONAL STUDY

Kuntare Kussia, MD[1], Eyasu Mesfin Kassa, MD[1], Rahel Demissew, MD[1]

ABSTRACT

BACKGROUND: Intrauterine growth restriction is a common obstetric complication. Based on the severity, it is classified into stages 0-IV. Stage II IUGR is defined as ultrasound estimated fetal weight less than 10th percentile for gestational age with absent end diastolic velocity on umbilical artery Doppler ultrasound. Studies focusing on perinatal outcome of specific class of IUGR are limited.

OBJECTIVE: The aim of this study was to show the magnitude of stage II IUGR and see the perinatal outcome of early preterm stage II IUGR at two public hospitals in Addis Ababa, Ethiopia.

METHOD: A retrospective cross sectional study was conducted from January 2019 to August 2022. Data was collected from medical records using a structured pre-tested questionnaire. The data was coded, entered, and analyzed using SPSS version 25.

RESULT: There were 49,338 deliveries at the two study hospitals. Of these 192 pregnancies were complicated by stage II intra uterine growth restriction; 151 of which were diagnosed at the early preterm gestational age. The prevalence of stage II IUGR was 0.39% while the prevalence of early preterm stage II intra uterine growth restriction was 0.3% out of the total deliveries. Preeclampsia was the leading obstetric complication diagnosed in 107 (70.9%) of the cases. Mode of delivery for all of the neonates was by cesarean section and all required neonatal intensive care unit admission. The single most common perinatal morbidity was respiratory distress, which accounted for 42 (27.8%) of the cases. Half of the 151 pregnancies diagnosed with early preterm stage II intrauterine growth restriction, 75 (50 %), ended up in perinatal death. The majority of the perinatal losses were during early neonatal period, 56% (42/75). Compared to those with birth weight of <1000gm, those with birth weight of 1500-2499gm had more than 37 times chance of survival in the perinatal period (AOR=37.67 (7.05, 201.36), p<0.000).

CONCLUSION: The prevalence of stage II IUGR was 0.39% whereas the prevalence of early preterm stage II IUGR was 0.3%. Early preterm stage II IUGR was associated with significant perinatal morbidity and mortality. Birth weight was a determinant factor significantly associated with perinatal survival.

KEY TERMS: IUGR, Stage II IUGR, perinatal death, perinatal outcome.

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INTRODUCTION

Intrauterine growth restriction (IUGR) is a complex syndrome characterized by fetal growth defect that leads to failure to achieve the genetically determined growth potential.[1] Several international professional organizations define IUGR as ultrasound estimated fetal weight less than the 10th percentile for the gestational age.[2] IUGR is a common obstetric complication affecting 5-10% of pregnancies. The highest incidence of IUGR was reported in South Central Asia, where it accounts for about 33%.[3] In Ethiopia, there are few studies done on IUGR in general and IUGR with specific Doppler abnormality in particular. In a hospital based cross sectional study conducted in South Gondor, IUGR prevalence was 23 %.[4] The prevalence of IUGR with severe UA Doppler abnormality (absent or reversed end diastolic (A/RED) velocity), i.e. stage II or stage III IUGR, is even rarer and is about 2.13%.[5]

The etiology of IUGR is diverse and overlapping and the pathophysiology is complex. The underlying cause can be due to maternal medical or obstetric complications, fetal condition, placental disease or the overlap of these.[2, 6] Fetal causes of IUGR include structural and chromosomal abnormalities, fetal infection, and exposure to drugs-both prescription and drugs of abuse.[2, 6]

Ultrasound has become the most essential tool in the diagnosis and growth monitoring of fetuses with IUGR. Doppler ultrasound specifically has revolutionized the diagnosis and management of fetal growth restriction. Doppler ultrasound of fetal vessels is used for a stage-based classification of fetal growth restriction based on the severity of the Doppler abnormality. It therefore helps guide timing of delivery and prediction of outcome. Accordingly, fetal growth restriction is classified into five stages based on Doppler abnormality.[7]

Stage 0 IUGR: EFW<10th percentile with normal Doppler

Stage I IUGR: EFW<3rd percentile OR EFW<10th percentile with UA PI>95th percentile

Stage II IUGR: EFW<10th percentile and AEDV on UA Doppler study

Stage III IUGR: EFW<10th percentile and REDV on UA Doppler study

Stage IV IUGR: EFW<10th percentile with reversed diastolic flow of ductus venosus (DV) or pathologic CTG

Studies have confirmed that the perinatal outcome of growth-restricted fetuses with underlying placental disease highly correlates with the degree of Doppler abnormality.[8, 9]

IUGR is one of the most common causes of perinatal morbidity and mortality. Perinatal mortality and morbidity is high for stage II IUGR and above, compared to stage 0 or stage I IUGR. Preterm delivery is also more common among those with A/RED velocity of umbilical artery Doppler ultrasound.[5, 10-12] The adverse perinatal outcome is even worse in early onset disease, i.e. when it is diagnosed before 32 weeks of gestation.[13, 14] Perinatal outcome of IUGR with AEDV of umbilical artery Doppler is poor. Perinatal outcomes such as APGAR score at 1 min below 4, use of a ventilator, admission to the neonatal intensive care unit (NICU), respiratory disease, neurologic disease, neonatal sepsis, anemia, thrombocytopenia, and neonatal mortality were statistically less favorable in the AEDV group compared to those in the control group independent of gestational age and presence of oligohydramnios.[15] In addition, long-term health consequences are also considerable. Low birth weight caused by IUGR was known to be associated with increased rates of cardiovascular disease and noninsulin-dependent diabetes in adult life.[16]

Prenatal screening, early diagnosis, surveillance and timing delivery based on antepartum test result are the only strategies currently available in the management of intrauterine growth restricted fetuses. Antepartum surveillance with fetal BPP and Doppler ultrasound has been the mainstay of the management of these pregnancies in guiding either delivery or expectant management. Particularly important is Doppler study of ductus venosus as it

predicts perinatal outcome and time delivery in early intrauterine fetal growth restriction.[17] Early onset IUGR poses a great challenge of management.[18,19] There is lack of consensus regarding mode and the timing of delivery.[20-22] The high likelihood of disease progression and fetal deterioration necessitates intervention, whereas early delivery increases perinatal mortality. This requires adequate data on perinatal outcome of IUGR with respective Doppler abnormalities. Perinatal outcome of stage 0 and stage I IUGR is slightly higher but comparable with pregnancies without IUGR. On the other hand, pregnancies with stage III and above have the worst perinatal outcome. Stage II IUGR is a gray area as to the antepartum management, time of delivery, and perinatal outcome.[23] Studying perinatal outcome of specifically stage II IUGR may be helpful in providing information that can contribute to guideline development for the management of this cohort.

Controversies continue until strong evidence is available to guide the management of IUGR with AEDV. Studies on perinatal outcome of stage II IUGR are limited in the local context. This study will contribute in this regard by demonstrating the perinatal outcome of early preterm IUGR with AEDV of the UA. The purpose of this study is to show the magnitude and perinatal outcome of early preterm (28-34weeks of gestation) stage II IUGR in the set up of two public hospitals in Addis Ababa, Ethiopia.

METHODS

This was a facility based cross sectional study conducted at two government teaching hospitals in Addis Ababa, Ethiopia; namely Tikur Anbesa Specialised Hospital (TASH) and Gandhi Memorial Hospital (GMH). The study period was from January 2019 to September 2022.

Inclusion criteria: EFW<10th percentile and AEDV of UA Doppler study, singleton intrauterine pregnancy, early milestone confirmed gestational age, gestational age from 28-33+6 weeks at diagnosis, cesarean delivery, patients for whom complete pertinent information is obtained.

Exclusion criteria: multiple gestation, structural congenital anomalies, chromosomal anomalies, congenital intrauterine infection, EFW< 10th percentile but normal UA Doppler umbilical arterial Doppler abnormality other than AEDV, unknown gestational age, vaginal delivery, IUFD before IUGR is confirmed by Doppler study, incompletely documented patient information.

Independent variables: Maternal socio-demographic variables were age, marital status, religion, educational status and occupation. Obstetric variables included parity, GA at diagnosis, administration of medications magnesium sulfate & dexamethasone and obstetric complications. Obstetric complications included ante-partum hemorrhage (APH), preeclampsia, eclampsia, preeclampsia with HELLP syndrome, HELLP syndrome and others. Medical variables included complications that were diagnosed and grouped into chronic hypertension, cardiac disease, diabetes mellitus, chronic renal disease, and others.

Dependent outcomes/variables: Progress of disease to stage III or stage IV, antepartum intrauterine fetal death, intrapartum fetal death, Gestational age at delivery, APGAR score, need for neonatal resuscitation, perinatal mortality, perinatal morbidity, birth weight and discharge outcome at the end of the 1st week of post natal life.

Sampling procedure: According to the health management information system (HMIS) of the two hospitals, 49,338 deliveries took place from 2019 to 2021. Stepwise approach was followed to know the final sample size by using labor and delivery room registration books, OR registration books, ward admission & HMIS books and patient medical record. Initially, all cesarean deliveries and stillbirths of birth weight of ≤ 2500gm were screened from the labor ward registration book and 701 cases were identified. Of these 188 were stillbirths. Thereafter ward and OR registration books were reviewed by looking for patients admitted with the diagnosis

of stage II IUGR and those delivered by C/S for stage II IUGR or indications like NRBPP, HELLP syndrome or placental abruption. Subsequently, we identified 436 cases. The medical records of these 436 cases and stillbirths were reviewed to identify early stage II IUGR. At this stage, 192 cases managed for stage II IUGR were identified from which 41 were excluded because they did not fulfill the inclusion criteria and hence the final sample size was 151.

Data collection: A structured pre-tested questionnaire prepared in English was used to collect data from the patient medical record and NICU registration books. Data was collected from the time of admission to maternity ward when the patients were discharged from the hospital or 7th day postpartum, whichever comes first. Data was collected by researcher from the data source with cooperation from the staff at record offices, wards, OR, and NICUs of the two hospitals. All data sources were assessed through a stepwise approach to include all cases that fulfilled the inclusion criteria.

Data analysis: The collected data was coded, cleaned and analyzed using statistical package for social science version 25. Chi-square test of independence was done using the primary dependent variable (PND) as a dichotomous variable (yes and no). Bivariate regression analysis was conducted for independent variables with chi-square value of <0.05. Multiple regression analysis was then employed to those variables with P-value of <0.2 on bivariate analysis. Odds ratio (OR) with their 95% confidence intervals were computed to identify the presence and strength of association, and statistical significance was declared if $p < 0.05$. Descriptive statistics and summary tables were used to describe the study findings.

RESULT

Socio demographic variables:

A total of 49,338 deliveries took place from January 2019 to December 2021 at the two hospitals: TASH and GMH. Out of these 192 pregnancies were complicated by stage II IUGR and of these 151 were diagnosed at the early preterm gestational age. Hence, the prevalence of stage II IUGR was 0.39% whereas the prevalence of early preterm stage II IUGR was 0.3% out of the total deliveries.

The age of the majority of the mothers, 67 (43.4%), was in the range 26-30 years. There was no participant mother younger than 18 years. Nearly all the mothers, 149 (98.7%), were married. One hundred six (70.2%) were orthodox in religion followed by 35 (23.2%) Muslims. Sixty (39.7%) of the mothers have completed preparatory school. Higher education graduates accounted for 42 (27.8%) of the cases. Majority of the mothers, 82 (54.3%), were housewives and 41 (27%) were government employees. (Table 1)

Table 1: Socio-demographic characteristics of pregnant women managed for stage II IUGR.

Socio-demographic factor		Frequency	%
Maternal age in years	18-25	50	33.1
	26-30	67	43.4
	31-35	17	11.3
	>35	17	11.3
Marital status	Single	2	1.3
	Married	149	98.7
Religion	Orthodox	106	70.2
	Muslim	35	23.2
	Protestant	10	6.6
Educational status	Illiterate	8	5.3
	Up to grade 10 completed	41	27.2
	Preparatory completed	60	39.7
	Higher education	42	27.8
Occupation	Housewife	82	54.3
	Daily laborer	3	2
	Merchant	25	16.6
	Government employee	41	27.2

Maternal reproductive and obstetric characteristics

Nearly two-third, 90 (59.6%), were nulliparous. Multi-para (para1-4) and grand multiparity (para ≥5) accounted for 38.4% (58/151) and 2% (3/151) respectively. The majority of the diagnosis of stage

II IUGR, 81 (53.6%), was made at GA of 32-34 weeks whereas the rest 70 (46.4%) were diagnosed between 28-32 weeks of gestation. Majority, 131 (86.8%) had no chronic medical diseases. Cardiac diseases and chronic hypertension were identified in 7 (4.6%) and 4 (2.6%) of the cases respectively. Pre-gestational diabetes mellitus and chronic renal disease each complicated 2 (1.3%) of the cases. The remaining 5 (3.3%) of the cases were complicated by various medical complications like HIV, epilepsy etc. (Table 2)

Table 2: Maternal reproductive and obstetric variables of pregnant women managed for early preterm stage II IUGR

Maternal obstetric characteristics		Frequency	%
Parity	Nulliparous	90	59.6
	1 – 4	58	38.4
	≥5	3	2
Gestational age II IUGR at diagnosis of stage	28-32	70	46.4
	32-24	81	53.6
Medical complications	Chronic hypertension	4	2.6
	Cardiac disease	7	4.6
	Diabetes	2	1.3
	Renal disease	2	1.3
	Other (HIV, epilepsy, etc.)	5	3.3
	none	131	86.8

Preeclampsia was the leading obstetric complication diagnosed in 107 (70.9%) of the cases. In 18 (11.9%) of the cases preeclampsia with HELLP syndrome was diagnosed. On the other hand, HELLP syndrome complicated 6 (4%) of the cases. Ante-partum hemorrhage (APH) and eclampsia each complicated 1 (0.7%) of the cases. The remaining 15 (11.9%) of the cases grouped under 'other' were complicated by APH, oligohydraminios, preterm pre-labor rupture of the membranes or no any identifiable obstetric complication.

Majority of the participants, 101 (66.9%), were provided both magnesium sulfate and dexamethasone antenatally for seizure prophylaxis and/or fetal neuro-protection. Seven (4.6%) of the cases were provided only dexamethasone. In 2 (1.3%) of the cases, only magnesium sulfate was administered for seizure prophylaxis. In 41 (27.2%) of the cases, however, none of these medications were provided.

Perinatal outcome:

Out of the 151 pregnancies complicated by stage II IUGR; 14 (9,3%) and 2 (1.3%) progressed to stages III and stage IV IUGR respectively. Of these 11/16 were diagnosed between the GA of 28-32 weeks and the remaining 5/16 were diagnosed between the GA of 32-34. Therefore, these 16 cases were excluded from the analysis of the perinatal outcome. There were 32 (21.2%) antepartum fetal losses. One case (0.7%) entered into labor while on inpatient management and fetus died before delivery. Hence, 102 babies were delivered alive as stage II IUGR.

Eighty four (55.6%) of the neonates were delivered between the GA of 32-34 weeks whereas 37 (24.5%) were delivered between the GA of 28-32 weeks and only 14 (9.3%) were delivered after 34 completed weeks. There was no report of presence of intra-op meconium. Overall 22 (14.6%) and 9 (6%) neonates had low first and fifth minute APGAR scores respectively. Ten (6.6%) of these required resuscitation with bag and mask ventilation. All of the neonates were admitted to the NICU. The birth weight of the neonates was 1500-2449 and 1001-1449 grams in 41 (27.2%) and 56 (37.1%) of the cases. The extremely low birth weight (<1000 grams) group accounted for 38 (25.2%) of the cases. The single most common perinatal morbidity was RDS, which accounted for 42 (27.8%) of the cases, followed by sepsis with RDS which accounted for 31 (20.5%) and sepsis alone, which accounted for 19 (12.6%). IVH was diagnosed in 3 (2%) of the neonates and in 5 (3.3%) neonates RDS, NEC, IVH, sepsis, & hyperbilirubinemia were co-morbid. NEC and Hyperbilirubinemia each accounted for 1 (0.7%) case. No neonate was diagnosed with electrolyte abnormality and MAS.

Half of the 151 cases diagnosed with early preterm stage II IUGR, 75 (50 %), ended up in perinatal death. Majority of the perinatal losses was during early neonatal period (ENND), 56 % (42/75). Only 21 (13.9%) of the neonates that were discharged improved within the 1st week of postnatal period and 39 (25.8%) stayed in the NICU beyond the 1st week of life. (Table 3)

Table 3: Summary of the perinatal outcome of pregnant women managed for early preterm stage II IUGR

Perinatal outcome		Frequency	%
Disease progression (n-151)	To stage III IUGR	14	9.3
	To stage IV IUGR	2	1.3
	No progress	135	89.4
Antepartum IUFD	Yes	32	21.2
	No	103	68.2
Gestational age at delivery	28-32	37	24.5
	32-34	84	55.6
	>34	14	9.3
Intra partum IUFD	Yes	1	0.7
	No	102	67.5
Presence of meconium	Yes	-	-
	No	102	67.5
1st minute APGAR	<7	22	14.6
	≥7	80	53
5th minute score	<7	9	6
	≥7	93	61.6
Need for resuscitation	Yes	10	6.6
	No	92	60.9
Birth weight in grams	≤1000	38	25.2
	1001-1449	56	37.1
	1500-2449	41	27.2
Admission to NICU	Yes	102	67.5
	No	-	-
Diagnosis at NICU	RDS	39	25.8
	Sepsis	19	12.6
	RDS, sepsis	31	20.5
	RDS, NEC, IVH, sepsis, hyperbilirubinemia	10	6.6
Discharge outcome	Died within the 1st 7 days	42	27.8
	Stayed beyond the 1st 7days	39	25.8
	Discharged improved within the 1st 7 days	21	13.9

Factors associated with Perinatal Death

A stepwise analysis was done to look for potential association between the independent variables and perinatal death. Variables (factors) which were associated with PND in the bivariate logistic regression analysis ($P < 0.05$) were maternal age, GA at diagnosis, obstetric complications and birth weight. After adjusting for potential co-founders in multivariate logistic regression analysis, only birth weight remained to be significantly associated with PND ($P < 0.05$).

Compared to those with birth weight of <1000gm, those with birth weight of 1500-2499gm had more than 37 times chance of survival in the perinatal period (AOR=37.67 (7.05, 201.36), p<0.000). When stage II IUGR was diagnosed between the GA of 32-34 weeks, chance of perinatal survival was 3.9 time higher (95% CI 1.97, 7.61, p<0.001) than when the disease was diagnosed at 28-32 weeks GA, although the association is lost in multivariate analysis. This means very early onset disease is likely to be associated with increased perinatal mortality. Similarly, early preterm stage II IUGR that has an onset later than 32 completed weeks is less likely to worsen when compared to 28-32 week, although not statistically significant.

Table 4: Bivariate and multivariate logistic regression of neonatal outcome of pregnant women managed for early preterm stage II IUGR.

Predictor variable	Frequency	Perinatal death (PND)		p-value	COR with 95%CI	P-value	AOR with 95%CI
	Yes	no					
Maternal age							
• 18-25	50	27	23	1		1	
• 26-30	67	34	33	0.164	1.14 (0.54, 2.37)	0.508	0.71 (0.25, 1.97)
• 31-35	17	4	3	0.036*	3.82 (1.09, 13.33)	0.630	1.49 (0.29, 7.69)
• >35	17	10	7	0.730	0.82 (0.27, 2.51)	0.984	0.98 (0.79, 5.93)
Gestational age at diagnosis							
• 28-32	70	47	23		1		1
• 32-34	81	28	53	0.000*	3.87(1.97, 7.61)	0.134	2.16 (0.79, 5.93)
Obstetric complication							
• Preeclampsia/ Eclampsia	108	50	58		1		1
• HELLP syndrome	6	5	1	0.114	0.17 (0.02, 1.53)	0.458	0.42 (0.04, 4.25)
• Preeclampsia with HELLP syndrome	18	15	3	0.008*	0.172 (0.47, 0.63)	0.346	0.42 (0.07, 2.57)
• Others	16	4	12	0.119	2.59 (0.78, 8.53)	0.081	4.54 (0.83, 24.74)
Birth weight							
• ≤1000gm	38	35	3		1		1
• 1001-1449gm	56	33	23	0.001*	8.13 (2.23, 0.29.65)	0.010*	7.12 (1.61, 31.41)
• 1500-2499gm	41	7	34	0.000*	56.67 (13.53, 237.4)	0.000*	37.67 (7.05, 201.36)

* p<0.05

DISCUSSION

This study showed that the overall prevalence of stage II IUGR was 0.39% (192/49,338) and the prevalence of early preterm (28-34 weeks of gestation) stage II IUGR was 0.3% (151/49,338) respectively. There are limited studies worldwide on the prevalence of stage II IUGR i.e. IUGR with AEDV. A systematic review conducted by Vogel et.al.5 showed the prevalence of both IUGR with either AEDV or REDV to range from 0.08%-2.13% among different populations. The result of this study is, therefore, comparable to their findings. Another study done in Uganda revealed that the prevalence of IUGR with AEDV among 155 pregnant women who had preeclampsia was 7.7%.24 This high prevalence may be due to the high risk of utero-placental insufficiency due to abnormal placental vascular development in this particular population.

Hypertensive disorders of pregnancy, particularly preeclampsia, were the most common obstetric complication identified in this study. This is an evidence for utero-placental cause of IUGR. Studies conducted by P. Gimei etal. and Kirsten GF etal. showed similar results.[24, 25] Another study done in Korea also found that hypertension was the most common obstetric and medical complication in pregnancies complicated by stage II IUGR.[15]

According to this study, the earlier the GA at which stage II IUGR was diagnosed, the more likely was it to progress to the Doppler abnormality i.e. stages III and IV IUGR. This leads to early intervention to deliver the fetus, which itself contributes to poor perinatal outcome. This finding is similar to what was found by O. M. Turan et al. in their study.[19] Indicated preterm delivery due to deteriorating fetal condition is most common in pregnancies with early onset disease, particularly before 30 weeks of GA.

This early intervention can itself be a contributor to poor neonatal outcome. Another indicated early delivery is for maternal indication because of co-morbid obstetric and medical complications, which is the case in this study. Studies done in Sweden and Germany revealed that indicated early delivery in early onset disease is associated with poor perinatal outcome.[18, 23] Ahmet also confirmed this by his systematic review that fetal growth restriction that onset before 34 weeks of gestation is associated with indicated early delivery, significantly lower survival rate, and increased perinatal morbidity.[26] All of these findings are consistent with the result of this study.

The most common perinatal morbidity in this study was RDS followed by sepsis, and co morbidity of RDS and sepsis. A local study by Tolu et al. revealed a similar result where newborns with abnormal UA Doppler studies were 2.3 times more likely to develop RDS compared to those with normal UA Doppler studies.[12] Other studies conducted in Germany and Uganda had similar results.[12, 13, 18] According to this study the perinatal mortality (fetal death and early neonatal death) of early preterm stage II IUGR was 49.7%. This is comparable with the finding of a study by Wang et al. which showed a perinatal mortality of 40% in stage II IUGR.[27] Another study done in Ethiopia at St. Paul hospital found that perinatal mortality among growth restricted fetuses with abnormal umbilical artery Doppler indices (elevated PI, AEDV and REDV) was 24.3%.[12] The difference may be due to their small sample size and their study of course included both AEDV and REDV.

CONCLUSION AND RECOMMENDATIONS:

The prevalence of stage II IUGR in the present study was 0.39% whereas the prevalence of early preterm stage II IUGR was 0.3%. This study showed that early preterm stage II IUGR is associated with significant perinatal morbidity and mortality. It also showed that hypertensive disorder of pregnancy is the commonest obstetric complication associated with IUGR. Birth weight was the only significantly associated factor which determined perinatal survival. This study can serve as a baseline for future studies on the same topic and on this specific population. To better understand the perinatal outcome of early preterm stage II IUGR and guide protocol development for its management, future large-scale prospective studies are recommended.

DECLARATIONS

Limitations: The main limitation of this study is being retrospective as there is a chance of missing some cases. In addition, due to the small sample size it was difficult to see the effect of each independent variable on the outcome variables.

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FACTORS AFFECTING KNOWLEDGE OF EMERGENCY CONTRACEPTION AMONG ADDIS ABABA UNIVERSITY FEMALE STUDENTS, ADDIS ABABA, ETHIOPIA

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ABSTRACT

BACKGROUND: The prevalence of unintended pregnancy is very high in Ethiopia and young adolescent girls are the major group affected by it. Lack of knowledge of emergency contraception method is one of the contributing factors for increase in the prevalence of unintended pregnancy.

OBJECTIVES: To assess the level of knowledge, as well factors affecting knowledge of emergency contraception among female students.

METHODS: An institution based cross-sectional study was conducted in Addis Ababa University. The sample size calculated was 648. Data was collected by self-administered questionnaire and data was entered, cleaned and analyzed using SPSS version 21. Descriptive statistics were performed to get frequency and percentages. Logistic regression and Chi square analysis were used to identify predictors of the outcome variable.

RESULT: A total of 648 students were included in the study giving a response rate of 100%. One hundred eleven (17%) of the respondents were sexually active. Four hundred thirty nine (68%) have ever heard about emergency contraception and 158 (24.5%) have ever used emergency contraception methods. From those respondents who ever heard of emergency contraceptive methods 265 (60%) (95% CI: 58%, 62%) were found to have good knowledge. The study has showed that field of study (AOR, 7.24; 95% CI: 4.103, 12.772, $P < 0.000$) and ever use of emergency contraceptive methods (AOR, 2.075; 95% CI: 1.234, 3.490, $P < 0.006$) were significantly associated with having a good knowledge of emergency contraceptive methods.

CONCLUSION AND RECOMMENDATION: The level of knowledge about emergency contraception is fair. This study showed faculty of study and ever use of emergency contraception is found to have significant association with good knowledge of emergency contraceptive methods. Even though the knowledge of the respondents is fair, much has to be done to improve their knowledge on the different methods by preparing a reproductive health education lesson especially for students in non-medical faculty who may have been unaddressed.

KEY WORDS: Addis Ababa University, emergency contraception, female, knowledge.

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INTRODUCTION

Unintended pregnancy is a pregnancy that occurs when no children are desired or a pregnancy occurred earlier than planned; it is either unwanted or a mistimed pregnancy. It has multiple impacts on the health of the mother and the newborn. The rate of unintended pregnancies and the rate of unintended birth are still high at 44% and 23 % respectively. Of all the pregnancies, 21.6 million were in Africa with 8.85 million occurring in Eastern Africa. [1,2]

Emergency contraceptives are methods of contraception used to prevent pregnancies after sexual intercourse. It is recommended that they should be used as early as possible after sexual intercourse, but can be effective within 5 days. When properly used, contraceptive will prevent over 95% of unwanted pregnancies if taken within 5 days of sexual intercourse. Contraceptive methods range from hormonal pills like dedicated emergency contraceptive pills containing ulipristal acetate or levonorgestrel, progestin only pills with Levonorgestrel or Norgestrel, or combined oral contraceptive pills to copper bearing intrauterine devices. [3]

Different studies have shown that the non-use, misuse, and lack of knowledge about emergency contraceptives is one of the cause for unintended pregnancy worldwide. Knowledge of emergency pregnancy has shown to be highly associated in preventing unintended pregnancy. [4,5]

In Ethiopia, the national figure suggested that 38% of pregnancies are unintended and further studies showed that there is high prevalence of unintended pregnancy or child birth putting a burden heavily on young, multiparas, unmarried, ethnic majority and those with only primary or no educational background women. University students are also one of the most vulnerable groups for having unintended pregnancies and studies showed that there is high prevalence of unintended pregnancy among university students. This calls the policy makers and health professionals to provide comprehensive reproductive health and contraception services to fulfill the unmet needs of university students.[6,7]

Lack of knowledge about emergency contraceptives is found to be one of the major barriers to widespread use of emergency contraception and hence high unintended pregnancy rates. Studies also showed that using emergency contraceptives is one of the most important and a second chance at preventing unintended pregnancy in adolescents. [8,9]

The knowledge of emergency contraceptives varies significantly from country to country. The reported knowledge levels vary significantly from poor knowledge to moderate and accurate. Different studies have showed that university students in India have a variable level of knowledge about emergency contraceptives. Even though most students heard about methods of pregnancy prevention, they lack the proper and accurate knowledge on emergency contraceptive methods. [10,11]

In this study we explored the level of awareness and factors affecting the knowledge of emergency contraception in one of the most vulnerable groups of our society, university students.

METHODS

The study was an institution-based cross-sectional study design undertaken at Addis Ababa University (AAU). Addis Ababa University is the oldest and the largest higher education institution of learning and research in Ethiopia. The university had 48,673 students; (33,940 undergraduate, 13,000 graduate, and 1733 Ph.D. students) and 6043 staff (2,408 academics and 3,635 support staff) in its 14 campuses in the 2019/2020 academic year. The university currently has 13,489 regular undergraduate students of which 3,528 are females.[12]

The sources of population were all female students in Addis Ababa University that were enrolled in 2022. The study population was 3351 female undergraduate students in Addis Ababa University who are currently attending courses.

The sample size was 648. Included in the study were all Addis Ababa University undergraduate female students who were currently enrolled and those students who were willing to be part of the study. Excluded were those who were not enrolled in regular day studies, those who were absent from class as at the time of data collection, and those who were not sexually active.

The study employed a two-stage sampling method. At first, participants were taken from all 11 colleges and participants were allocated to each college or institute proportionally. Secondly, participant students were selected from each college proportional to their year of study using a simple random sampling technique.

A pretested questionnaire which was designed in English was self–administered to the student. The questionnaire was pretested using students who were then exempted from the study. The data was cleaned and entered in SPSS version 21 for statistical analysis. The results were expressed as frequency and percentage.

Bivariate analysis was done to determine statistical association between dependent and independent variables; those dependent variables with less than 0.25 p-values were entered into multivariable binary logistic regression controlling the possible effect of confounders. Those variables with significant associations with a p-value of less than 0.05 were identified as significant variables based on the odds ratio (OR), with a 95% confidence interval.

Ethical clearance was obtained from the Institutional Review Board (IRB) of College of Health Sciences of the Addis Ababa University. The required information was collected after obtaining written consent from each participant. The right was given to the study participants to refuse or discontinue participation at any time they wanted and the opportunity to ask any question about the study was offered. For anonymity, the participant's name was not to be used at the time of data collection and all other personal information was kept entirely anonymous and confidentiality throughout the study period.

RESULT

Six hundred and forty-eight (648) participants were included in the study giving a response rate of 100% with the mean age of respondents 20.7±1.3. Majority of the respondents 575 (88.7) were Christians with most respondents 604 (93.2%) having no partner like boyfriend or husband. Most of the respondents 492 (75.5%) were from non-medical field of study. A good number of students were first year students followed by second year and third year (232 (35.8), 227(35) and 189(29.2)) respectively (Table 1).

Table 1. Sociodemographic, academic of Addis Ababa university female undergraduate students, 2022

Variable	Category	Frequency (n = 648)	Percent
Age group (year)	≤20	313	48.3
	>20	335	51.8
Religion	Christian	575	88.7
	Muslim	73	11.3
Marital status	No partner	604	93.2
	With partner	44	6.8
Field of study	Medical	156	24.5
	Non-medical	492	75.5
Year of study	Year I	232	35.8
	Year II	227	35
	Year III and above	189	29.2

Sexual and reproductive characteristics

Regarding to respondents' reproductive history, most of the respondents 537(82.9%) were not sexually active and only 439 (67.7%) of the participants had heard about emergency contraceptives methods prior to this study. Among all the participants only 357 (55.1%) had taken lessons on sexual education. Among all the participants only 159 (24.5%) used emergency contraception methods (Table 2).

Table 2. Sexual and reproductive characteristics of Addis Ababa university female undergraduate students, 2022

Variable	Category	Frequency (n = 648)	Percent
Are you sexually active	Yes	111	17.1
	No	537	82.9
Ever heard about emergency contraceptive	Yes	439	67.7
	No	209	32.3
Have you ever had sexual education lesson	Yes	357	55.1
	No	291	44.9
Have you ever used emergency contraception	Yes	159	24.5
	No	489	75.5

Knowledge of respondents about emergency contraceptive methods

Regarding knowledge, among the 439 respondents who had heard about emergency contraception methods, 365 (85.4%) knew at least one method of emergency contraception and 99 (22.6%) knew both IUD and emergency pills. Three hundred and eighty-eight of these respondents knew where they can get the methods. Only 278 (65.4) of the participants knew the right indication for using the methods.

While 259 (59%) and 85 (19.4%) of the participants knew the maximum time for use of emergency contraceptive pills and IUCD respectively. Most of the participants 216 (49.2%) correctly knew the effectiveness of the emergency contraceptive methods. (Table 3).

Table 3. Knowledge of emergency contraceptive methods of Addis Ababa university female undergraduate students who have heard about ECM, 2022

Variable	Category	Frequency (n = 439)	Percent
Methods used as emergency contraceptives	Pills	247	56.3
	IUCD	17	3.9
	Pills and IUCD	99	22.6
	Implants	12	2.7
	Injectables	13	3
	I don't know	51	11.6
Where can a women obtain emergency contraceptives	Heath facility	178	40.5
	Pharmacy	210	47.8
	I don't know	51	11.7
What is the indication for using emergency contraceptives	After unprotected intercourse	278	65.4
	When pregnancy occurs	49	11.2
	As a regular method of contraceptives	43	9.8
	I don't know	60	13.7
How much do you think is the time to use emergency contraception pills to prevent pregnancy	72 hours	259	59
	48 hours	27	6.2
	24 hours	39	8.9
	12 days	20	4.6
	I don't know	94	21.4
What is the time to use IUCD to prevent pregnancy	72 hours	146	33.3
	48 hours	32	7.3
	24 hours	51	11.6
	5 days	85	19.4
	I don't know	125	28.5
How much effective do you think is the emergency contraceptive methods	Less than 75%	85	19.4
	Greater than 75%	216	49.2
	I don't know	138	31.4

According to our study, 265 (60.4%) (95% CI: 58%, 62%) of the respondents were found to have good knowledge about emergency contraceptive method, (Figure 1).

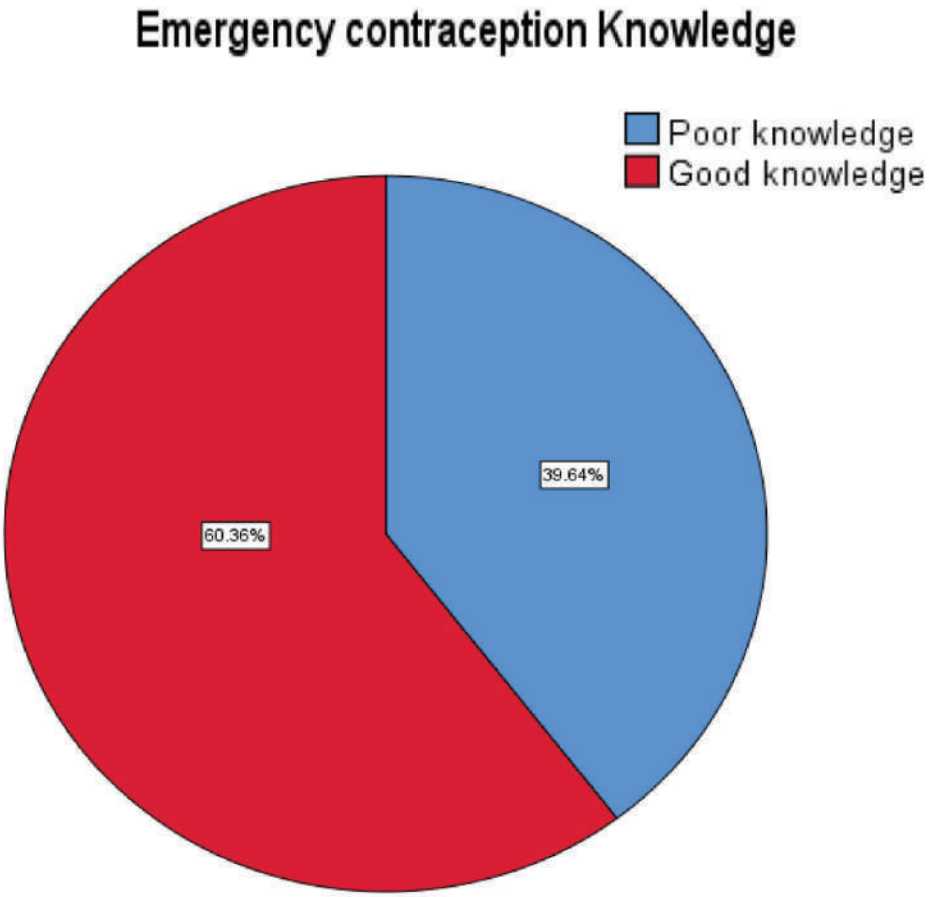

Figure 1. Knowledge of emergency contraceptive methods of Addis Ababa university female undergraduate students, 2022 (n = 439)

Determinants of knowledge of emergency contraception

On bivariate analysis, faculty of study and year of study variables were found to have statistically significant association and after controlling confounders using multivariable logistic regression analysis, faculty of study and ever heard of emergency contraceptive methods were found to have statistically significant association.

Female students who are enrolled in medical faculty are 7 times higher odds of being knowledgeable than those respondents who are enrolled in non-medical field (AOR: 7.24, 95% CI: 4.103, 12.772, P < 0.000). Respondents who had used emergency contraception method also have 3 times higher odds of being knowledgeable than those who have never used contraceptive methods (AOR: 2.07, 95% CI: 1.234, 3.49, P < 0.000). (Table 4)

Table 4. Association between socio demographic, academic and sexual and reproductive characteristics and knowledge of emergency contraceptive methods of Addis Ababa university female undergraduate students, 2022 (n = 439)

Variable	Knowledge of EC		COR (95%CI)	P value	AOR (95%CI)	P value
	Good Knowledge n(%)	Poor Knowledge n(%)				
Age						
≤20	31(51.7)	29(48.3)	0.662(0.383, 1.145)	0.14	0.864(0.449, 0.662)	0.661
>20	234(61.7)	145(38.3)	1		1	
Religion						
Christian	234(54.4)	160(40.6)	0.660(0.341, 1.281)	0.22	0.815(0.388, 1.709)	0.588
Muslim	31(68.8)	14(31.1)	1		1	
Marital status						
No partner	246(60)	158(40)	1		1	
Has partner	19(54.3)	16(45.7)	1.311(0.655, 2.626)	0.445	1.216(0.563, 2.623)	0.619
Faculty of study						
Medical	117(86.7)	18(13.3)	6.85(3.973, 11.814)***	0.000	7.24(4.103, 12.772)	***0.000
Non-medical	148(48.7)	156(51.3)	1		1	
Year of study						
Year I	73(53.3)	64(46.7)	1		1	
Year II	89(58.5)	63(41.5)	0.520(0.322, 0.842)**	0.008	0.760(0.424, 1.362)	0.356
Year III and above	103(68.7)	47(31.3)	0.645(0.402, 1.034)	0.069	1.04(0.611, 1.774)	0.882
Are you sexually active						
Yes	45(52.3)	41(47.7)	0.664(0.413, 1.067)	0.090	0.780 (0.446, 1.363)	0.383
No	220(62.3)	133(37.7)	1		1	
Have you ever had sexual education lesson						
Yes	181(59.2)	125(40.8)	0.845(0.555, 1.285)	0.43	0.762(0.464, 1.252)	0.284
No	84(63.2)	49(36.8)	1		1	
Have you ever used EC						
Yes	91(65.5)	48(34.5)	1.373(0.904, 2.085)	0.137	2.075(1.234, 3.490)	**0.006
No	174(58)	126(42)	1			

DISCUSSION

The study showed that 67.7% of respondents knew the presence of emergency contraceptive methods. Among respondents who have heard about emergency contraception, 60% have adequate knowledge of emergency contraception methods. This study has shown that faculty of study and previous use of emergency contraception are found to have a significant association with good knowledge of ECM. The results of our study revealed that one-fifth of the respondents are currently sexually active with more than two-thirds of the respondents not having heard of ECM, which is less than the findings of studies done in Kenya which showed 86% of the respondents have had heard about ECM. Our study showed higher respondents than a study done in South Africa, which has showed only half of the respondents had heard about ECM.[13,14] When we compare studies done in Ethiopia, it is lower than studies done in Harar and Addis Ababa which was 93.5% and 84.2% of respondents respectively, which could be due to time difference as the study was done a few years back and through time there could be a change in awareness about ECM. Our result is still higher than a study done by Debretabor and Jimma which was 55.5% and 41.9% of respondents respectively. [15-18] These could be also explained by the fact that recently most students enrolled at Addis Ababa University are from Addis Ababa and nearby cities.

Of those who had heard of emergency contraception, only 65.4% of the respondents knew the correct indication of when to use emergency contraception methods. This is comparable to a study done in Jimma and Harar which is 71% and 65% respectively, but higher than the study done in Debretabor which showed 13.9 % of the respondents knowing the correct indications. This is because the respondents in our study have more lessons in sexual and reproductive health and have higher ever use of ECM than the studies done in Debretabor, Hawassa, and Jimma which showed 28.1%, 10.8% and 11% of respondents having ever used emergency contraception methods respectively.[15,16,19] This can be explained by the lack of proper lessons on sexual and reproductive health lessons in high school as well as in the university.

Our study showed that 60% of the respondents have a good knowledge of ECM which is high compared to the study done in Kenya where only 42.6% of participants were found to have good knowledge of ECM and other studies done in India, Kenya, South Africa, and Nigeria also showed an overall low level of knowledge on ECM. [13,14,20,21]

The reason for this could be there is a system of accessing the ECM in clinics and pharmacies without a prescription, unlike in some countries. In other parts of Ethiopia, there are comparable findings with a study done in Harar and Hawassa showing 70% and 72.2% percent of respondents were knowledgeable, while a systematic review done in Ethiopia showed 27.2% of the respondents had good knowledge.[18,19,22] This might be because the university is located in the capital and the students might be exposed to more sexual and reproductive issues, higher rate of use of ECM, and have taken more lessons in sexual and reproductive health than the other studies i. Our study has shown that of all the respondents more than half, 55.1%, had taken sexual and reproduction lesson and 54.1% of the respondents had ever used emergency contraceptives which are higher than the studies done in Debretabor, Hawassa, and Jimma, which showed 28.1%, 10.8% and 11% of respondents have ever used emergency contraception method respectively. [15,16,22]

Our study has revealed that the respondent field of study and ever use of emergency contraception are statistically associated with knowledge of emergency contraception. Unlike the study done in Addis Ababa which found no association between sociodemographic, educational, and reproductive variables of respondents with knowledge of emergency contraceptives, our study found that those whose field of education is medical are found to have 7 times more odds of being knowledgeable

that the counterparts. This finding is in line with the study done in Kenya which showed college of education is associated with the level of knowledge of the responders. This is because those students who have taken a formal lesson in reproductive health are more knowledgeable about the issues of sexual reproductive health. Those respondents who ever used emergency contraception are found to have 2 times more odds of being knowledgeable than their counterparts. Our study is incongruent with the study done in Harar which showed that a history of utilization of ECM is associated with being knowledgeable about ECM.[13,17,23] This is because these individuals have more experience using the methods and have more information than their counterparts.

Unlike the study done in Debretabor which has shown that respondents, whose ages are between 20 and 24 and who are married and divorced are found to be more knowledgeable, and in Harar who showed being older than 20 years were found to be more knowledgeable; our study hasn't shown any association.[15,18] This might be because our study's number of respondents who are married or divorced is small compared to the other studies.

Including a large number of respondents is one of the strengths of this study and the study includes all students from each department / institute and proportionally from each year of study is the other strength. The limitations of our study are first, the study was only done in one setting which might make it difficult to generalize for the country. Secondly, the study uses only a quantitative method of data collection and might not be helpful to know the detailed reason why people have less knowledge of ECM.

CONCLUSION

The level of knowledge about emergency contraception is fair. The study showed area of study and ever use of emergency contraception have significant association with good knowledge of ECM.

Though the knowledge of the respondents is good, much has to be done to improve the knowledge regarding the availability of different methods and the effectiveness of the methods used by giving a reproductive health education especially for students who are enrolled in non-medical areas of study.

ABBREVIATIONS

AAU: Addis Ababa University;
ACIPH: Addis Continental Institute of Public Health;
AOR: Adjusted Odd Ratio;
CI: Confidence Interval;
COR: Crude Odd Ratio;
EC: Emergency Contraception;
ECM: Emergency contraception Methods;
IRB: Institutional Review Board;
IUCD: Intrauterine Contraceptive Device;
IUD: Intrauterine Device; OR: Odds Ratio

DECLARATIONS

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Authors Contribution

YF has developed the idea, wrote the proposal, and collected the data. NF has participated on data collection and analysis. YF and NF wrote the manuscript. EK reviewed the manuscript,reference articles, and wrote the final manuscript. MHB reviewed data analysis, and final manuscript.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that this manuscript was approved by all authors in its form and that no competing interest exists.

Conflict of interest

We declare no conflict of interest.

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PREVALENCE OF PRE-ECLAMPSIA AND ECLAMPSIA AND MATERNO-FETAL OUTCOMES AT A HEALTH FACILTY IN DELTA STATE, NIGERIA

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John Edjophe Arute, PhD[1], Delight Weluche Oliseyenum BPharm[1]

ABSTRACT

BACKGROUND: Globally, pre-eclampsia and eclampsia complicate up to 4.6% and 1.4% of pregnancies respectively, but disproportionally account for nearly 18% of all maternal deaths worldwide, with an estimated 62,000 to 77,000 deaths per year.

OBJECTIVE: This study determined the prevalence of pre-eclampsia and eclampsia, and compared outcomes.

METHODS: This was a retrospective cross-sectional study utilizing the case files of women admitted to the maternity ward of the obstetrics and gynecology unit in Central Hospital, Ughelli, Delta State, Nigeria, from 1st August 2020 to 30th July 2022. Socio-demographic characteristics, maternal and fetal complications and outcomes, prevalence rate of preeclampsia and eclampsia, were presented as frequencies and percentages.

RESULTS: Of the 6291 mothers which were delivered of their babies in the maternity ward of the obstetrics and gynecology department, 120 (1.9%) were diagnosed with pre-eclampsia and eclampsia; only 108 which had complete documentation, were used for the study. Age range of the participants was 16-45 years. The majority, 88 (81.5%) were married, 70 had secondary education and higher, (64.8%); 42 (38.9%) were nulliparous at admission and 67 (62%) were unbooked at the antenatal clinic. Fifty three (49.1%) had preeclampsia, while 55 (50.9%) had eclampsia. The majority, 107 (99.1%), were discharged home alive and 75 (69.4%) had no maternal complications. Number of fetuses delivered were 114, 95 (83.3%) were born alive, 68 (59.6%) weighed less than 2500g, and 91 (95.8%) neonates had a good APGAR score at the 5th minute.

CONCLUSION: The prevalence of pre-eclampsia and eclampsia was low, however there were high rates of perinatal deaths and occurrence of unfavourable materno-fetal complications.

KEYWORDS: Pre-eclampsia, Eclampsia, Prevalence, Materno-fetal outcomes, maternal complications, fetal complications.

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INTRODUCTION

Pre-eclampsia (PE) is a kind of pregnancy-induced hypertension that is characterized by substantial proteinuria with or without edema and usually resolves by the 12th post-partum week[1]. It is a potentially fatal multisystem disorder of pregnant women and a major cause of perinatal morbidity and death[2,3].

Around 25% of all preeclampsia cases are severe[4]. In its most severe form, the illness can cause hepatic and renal failure, as well as "disseminated intravascular coagulopathy (DIC) and central nervous system (CNS) problems." Preeclampsia-associated seizures indicate that the illness has advanced to eclampsia. Eclampsia, a complication of severe pre-eclampsia, is typically characterized as new onset grand mal seizure activity and/or unexplained coma during pregnancy or postpartum in a woman with pre-eclampsia signs or symptoms[5].

Pre-eclampsia/eclampsia (PE/E) complicate up to 4.6% and 1.4% of pregnancies worldwide, respectively, but cause approximately 18% of all maternal fatalities globally, with an estimated 62,000 to 77,000 deaths per year [3]. Perinatal health suffers as well, with an estimated 500,000 newborns dying each year from PE/E [6]. The prevalence and mortality linked with PE/E vary by region. Women in low-resource nations have a greater chance of getting preeclampsia than women in high-resource countries[6]. They are also at a higher risk of maternal and perinatal morbidity and death from these conditions due to a lack of prenatal care, access to hospital care, a lack of resources, and inappropriate diagnosis and management of patients with PE/E in developing countries[7].

No study has documented the prevalence of PE/E in Delta State in the past. However, previous studies in other parts of Nigeria have reported rates as high as 3.6% and 4.0%[8,9]. This study provides a baseline understanding of the prevalence of pre-eclampsia and eclampsia at the health facility and also helps identify the materno-fetal outcomes after the launch of free maternal and child care services in the State in line with one of the Sustainable Development goals.

METHODS

Study design

This was a retrospective cross-sectional study. The required information was extracted from the patient's case folders using a proforma.

Study setting

The study was undertaken at the Obstetrics and Gynecology Department (O & G) at Central Hospital, Ughelli. The department offers obstetrics and gynecology care. Central hospital, Ughelli is a State-owned health care facility.The hospital is in Ughelli, Delta State, which is within the south-south region of Nigeria. The hospital provides secondary healthcare services to the residents of the town.

Population

The study was carried out using medical records of all women managed for pre-eclampsia and eclampsia between August 2020 and July 2022 in the facility.

Sample size determination

Sample size was determined by the formula used by previous authors[10];

$$n = \frac{Z^2 p[1-p]}{d^2}$$

Where;

"n= the sample size"

"Z= the statistic corresponding to level of confidence (at 5% type 1 error, $P < 0.05$) = 1.96"

"p= expected prevalence (that can be obtained from same studies or a pilot study conducted by the researchers)"

"d= precision (corresponding to effect size) =0.05"

The expected prevalence (p) =3.6% for pre-eclampsia based on a previous study in Abuja, North-central Nigeria[9].

Therefore, the sample size for this study was 53.Bearing in mind an attrition of 15% attributable to inability of accessing case folders, the sample size was approximated to be 61.However, the total

sample size population used for this study was 120 because with good access to the medical records of all women managed for PE/E, all case files of patients who came to the facility between August 2020 and July 2022 were included in the study.

Criteria for inclusion

Pregnant women managed in the O & G unit of Central Hospital, Ughelli, during the study period for pre-eclampsia and eclampsia.

Exclusion criteria

Women who had chronic hypertension prior to their pregnancy or before the 20th week of pregnancy.

Instrument for data collection

A proforma was used to extract the required information from the patient's case folders. The proforma consisted of the section on socio-demographic data, occurrence of pre-eclampsia and eclampsia, as well as the section on maternal and fetal complications.

Data analysis

A descriptive analysis of the rates of pre-eclampsia and eclampsia, as well as the frequencies of all factors were done. The prevalence was calculated "by dividing the number of pregnant women with PE/E by the total number of deliveries during the study period, and maternal and fetal outcomes were assessed using medical records with documentation of the variables of interest (age, parity, estimated gestational age, booking status, antenatal clinic attendance, maternal outcomes, and fetal outcomes)." The predominant "maternal outcome was maternal death, while stillbirth was the primary fetal outcome. Parity, gestational age at delivery, fetal birth weight, and APGAR (Appearance, Pulse, Grimace, Activity, and Respiration) scores were recorded during the first and fifth minutes of life." Data analysis was aided with Microsoft excel.

Ethical consideration

Ethical approval was obtained from the Ethical committee in Central Hospital, Ughelli, before we started the study.

RESULTS

During the period under review, a total of 6,291 deliveries were recorded in the hospital, of which 120 were women managed for pre-eclampsia and eclampsia, thus giving an overall prevalence of 1.91% (PE =1.02%, E=0.89%). However, 108 (90%) of the cases had proper documentation of information and were included in the study. The age range of participants was 16 to 45 years. The majority were married, 88 (81.5%), had secondary or tertiary education 70(64.8%), and 42 (38.9%) were nulliparous at admission into the maternity ward. 67(62%) were unbooked and did not attend antenatal care; details of socio-demographics are shown in Table 1. Of the 108 women with PE/E, 53 (49.1%) had preeclampsia while 55 (50.9%) had eclampsia; 75 (69.4%) had no maternal complications and 107 (99.1%) were discharged home alive (Table 2). Number of fetuses were 114 which included six twin gestations.68 (59.6%) weighed less than 2500g. The majority, 95 (83.3%) were born alive and 91 (95.8%) had a good APGAR score in the 5th minute after birth (Table 3). Maternal complications in women with PE recorded in the study included abruptio placenta 6 (10.9%), pulmonary edema 5 (9.1%), organ damage 1 (1.9), thrombocytopenia 2 (3.8), PROM 2 (3.8%), altered mental status 1 (1.9%), visual scomata 1 (1.9%), and peripheral sepsis 2 (3.8%). Complications in women with eclampsia included abruptio placenta 2 (3.8%), pulmonary edema 1 (1.9%), organ damage 1 (1.9), thrombocytopenia 2 (3.8), stroke 2 (3.8%), altered mental status 3 (5.5%), peripheral sepsis 2 (3.8%) and cortical blindness 1 (1.9%) (Table 4). Fetal complications in women with PE included preterm birth 21 (36.8%), low birth weight 26 (45.6%), oligohydramnios 9 (15.8%), fetal distress 1 (1.8%) and IUFD 6 (10.5%). Additionally, fetal complications in women with eclampsia recorded were pre-term birth 29 (50.0%), low birth weight 42 (73.7%), oligohydramnios 13 (22.8%), fetal distress 3 (5.3%), IUFD 3 (5.3%) and admission to ICU 1 (1.8%) (Table).

Table 1: Clinical features and characteristics of women presenting with Preieclampsia and Eclampsia at Central hospital, Ughelli between August 2020 and July 2022

Characteristics	Pre-eclampsia (%)	Eclampsia (%)	Total (n=108)
Age;			
≤ 19	4 (7.6)	13 (23.6)	17 (15.7)
20 – 24	8 (15.1)	16 (29.1)	24 (22.2)
25 – 29	14 (26.4)	7 (12.7)	21 (19.4)
30 – 34	14 (26.4)	5 (9.1)	19 (17.6)
≥ 35	13 (24.5)	14 (25.5)	27 (49.1)
Education			
No formal education	2 (3.8)	7 (12.7)	9 (8.3)
Primary education	3 (5.7)	5 (9.1)	8(7.4)
Secondary education	23 (43.4)	30 (54.6)	53 (49.0)
Tertiary education	22 (41.5)	8 (14.5)	30 (27.8)
Not documented	3 (5.7)	5 (9.1)	8 (7.4)
Parity			
Nulliparous	19 (35.8)	23 (41.8)	42 (38.9)
Primiparous	9 (17.0)	10 (18.2)	19 (17.6)
Multiparous	19 (35.8)	13 (23.6)	32 (29.6)
Grand multiparous	6 (11.3)	9 (16.4)	15 (13.9)
Marital status			
Single	5 (9.4)	15 (27.3)	20 (18.5)
Married	48 (90.6)	40 (72.7)	88 (81.5)
Antenatal attendance			
Yes	30 (56.6)	11 (20.0)	41 (38)
No	14 (26.4)	38 (69.1)	52 (48.1)
Not documented	3 (5.7)	2 (3.6)	5 (4.6)
Referred	6 (11.3)	4 (7.3)	10 (9.3)
Booking status			
Booked	30 (56.6)	11 (20)	41 (38)
Unbooked	23 (43.4)	44 (80)	67 (62)

Table 2: Maternal Outcomes of pregnant women presenting with pre-eclampsia and eclampsia at Central hospital, Ughelli between August 2020 and July 2022

Characteristics	Pre-eclampsia (%)	Eclampsia (%)	Total (n = 108)
Maternal complications			
Yes	11 (20.8)	22 (40)	33 (30.6)
No	42 (79.2)	33 (60)	75 (69.4)
1^0 maternal outcome			
"Maternal death"	0 (0)	1 (1.8)	1(0.9)
Alive	53 (100)	54 (98.2)	107 (99.1)
"Route of delivery"			
"Vaginal delivery"	23 (43.4)	10 (18.2)	33 (30.6)
Caesarian section	30 (56.6)	46 (81.8)	75 (69.4)

Table 3: Fetal Outcomes of pregnant women presenting with pre-eclampsia and eclampsia at Central hospital, Ughelli between August 2020 and July 2022

Characteristics	Pre-eclampsia (%)	Eclampsia (%)	Total (n = 114)
Fetal outcomes			
Stillbirth	7 (12.3)	12 (21.1)	19 (16.7)
Alive	50 (87.7)	45 (78.9)	95 (83.3)
APGAR Scores 1^{st} minute			
< 7	10 (20.0)	30 (66.7)	40 (42.1)
≥ 7	40 (80.0)	15 (33.3)	55 (57.9)
APGAR scores 5^{th} minutes			
< 7	1 (2.0)	3 (6.7)	4 (4.2)
≥ 7	49 (98.0)	42 (93.3)	91 (95.8)
Birth weight			
< 1000g	0 (0)	1 (1.8)	1 (0.9)
1000 – 1499g	2 (3.5)	3 (5.3)	5 (4.4)
1500 to < 2500g	24 (42.1)	38 (66.7)	62 (54.4)
2500 to < 4000g	30 (52.6)	15 (26.3)	45 (39.5)
≥ 4000	1 (1.8)	0 (0)	1 (0.9)

Table 4: Maternal Complications in women presenting with pre-eclampsia and eclampsia at Central hospital, Ughelli between August 2020 and July 2022

Characteristics	Pre-eclampsia (%)	Eclampsia (%)	Total (n = 114)
Fetal outcomes			
Stillbirth	7 (12.3)	12 (21.1)	19 (16.7)
Alive	50 (87.7)	45 (78.9)	95 (83.3)
APGAR Scores 1st minute			
< 7	10 (20.0)	30 (66.7)	40 (42.1)
≥ 7	40 (80.0)	15 (33.3)	55 (57.9)
APGAR scores 5th minutes			
< 7	1 (2.0)	3 (6.7)	4 (4.2)
≥ 7	49 (98.0)	42 (93.3)	91 (95.8)
Birth weight			
< 1000g	0 (0)	1 (1.8)	1 (0.9)
1000 – 1499g	2 (3.5)	3 (5.3)	5 (4.4)
1500 to < 2500g	24 (42.1)	38 (66.7)	62 (54.4)
2500 to < 4000g	30 (52.6)	15 (26.3)	45 (39.5)
≥ 4000	1 (1.8)	0 (0)	1 (0.9)

Table 5: Fetal Complications in newborns delivered by pregnant women presenting with pre-eclampsia and eclampsia at Central hospital, Ughelli between August 2020 and July 2022

Characteristics	Pre-eclampsia (%)	Eclampsia (%)	Total (n = 114)
Pre term birth	21 (36.8)	29 (50.0)	50 (43.9)
Low APGAR score			
1st minute	10 (17.5)	30 (52.6)	40 (35.1)
5th minute	1 (1.7)	3 (5.3)	4 (3.5)
Low birth weight	26 (45.6)	42 (73.7)	68 (59.6)
Oligohydramnios	9 (15.8)	13 (22.8)	22 (19.3)
Fetal distress	1 (1.8)	3 (5.3)	4 (3.5)
IUFD	6 (10.5)	3 (5.3)	9 (7.9)
Admission to ICU	0 (0)	1 (1.8)	0 (0.9)

DISCUSSION

Overall prevalence of preeclampsia and eclampsia was lower than obtained in previous studies in Nigeria with rates as high as 3.6% and 4.0%[8,9]. This marked variation could have resulted from the previous studies aside covering wider time gap, were also done in tertiary healthcare facilities likely with more referrals from other centers. Prevalence of preeclampsia was also lower than seen in previous studies which reported a range of 2.3% -3.2% in China, Sweden, Norway, and Pakistan[11-13]; 3.02% and 3.53% in Abuja and Bayelsa respectively [8,14]; but higher than the rate of 1.2% reported in Calabar[15]. Prevalence of eclampsia in this study is, however, comparable to 0.91%[16] but higher than 0.28%[17] and 0.58%[8] reported in previous Nigerian studies. A plausible explanation to this could be due to the high proportion of unbooked women in this study as suggested by Esike and colleagues.[15] The prevalence of eclampsia does fall, within the range of 0.2% and 1.42% found in a study conducted across sub-saharan Africa, India and Haiti[18] and is far lower than the 6% reported in an Ethiopian healthcare facility[19]. According to WHO, pregnant women should receive at least eight antenatal care contacts in order to have a positive pregnancy experience[20]. Unfortunately, only 67% of pregnant women in Nigeria receive antenatal care from a qualified practitioner, with just 57% receiving at least four antenatal appointments[21].

Maternal fatality was lower than a range of 1.6% to 3.9% in previous studies,[8,16,18,19] but higher than in a Pakistani study where no maternal deaths occurred among pre-eclamptic women. Low fatality rates could have been as result of low prevalence of eclampsia in the study population or adequate management of severe cases. An Ethiopian study with high prevalence of eclampsia reported low maternal fatality as a result of specialized care at the facility[19]. Maternal complications were comparable with those which occurred in previous studies with abruption of the placenta accounting for the most frequent of all. Unfavourable maternal outcomes resulting from PE/E such as abruptio

placenta, HELLP syndrome, pulmonary edema, thrombocytopenia, organ damage, stroke, altered mental status, premature rupture of membranes (PROM), peripheral sepsis, and visual scotomata, were higher than in a previous report where between 14.6% and 18.1% developed these complications[8,9].

Caesarian delivery rates in this study are within the range of 48.82 to 71.20% previously reported[9,14,15,22] due mainly to the fact that the majority of the women were unbooked and referred late from other hospitals. The attributing factor to the high rate of caesarian section in this study was because of other complications of PE/E, requiring caesarian section for optimal maternal and fetal outcome.

The stillbirth rate, though lower than the findings in some studies,[9,14] where rates of 36.8% and 29.1% were observed, was however higher than reported in the Abuja study of 10.7%[8]; these further depict the impact of pre-eclampsia and eclampsia on perinatal mortality.

This study has improved the body of knowledge because there is paucity of studies on the prevalence of E/PE in our locality. This is of paramount importance because the Delta State government, in a bid to reduce maternal mortality, flagged off the free maternal care in 2007 which has provided free Medicare to pregnant women in the State. This study has therefore revealed how well these health indices have improved.

Although this study might be limited by its single center and short time frame, it provided insight into the area of interest and further research should focus on a wider coverage in the State.

CONCLUSION

The prevalence of preeclampsia was 1.02% and eclampsia was 0.89% respectively. There were high perinatal deaths and occurrence of unfavourable materno-fetal complications.

Authors' Contributions

Ogheneovo Clement Aghoja and Delight Weluche Oliseyenum conceived and designed the study. Data collection was done by Delight Weluche Oliseyenum and Ogheneovo Clement Aghoja. The data was analyzed by Ufuoma Ahwinahwi and John Edjophe Arute. Manuscript was initially drafted by Delight Weluche Oliseyenum and the corrected draft was made by Ogheneovo Clement Aghoja and Ufuoma Shalom Ahwinahwi. The manuscript was reviewed by John Edjophe Arute and Ogheneovo Clement Aghoja, all the authors read and approved the final manuscript.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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TIMELY INITIATION OF POSTPARTUM CONTRACEPTIVE UTILIZATION AMONG WOMEN OF CHILD BEARING AGE IN ARBA MINCH TOWN , GAMO ZONE, ETHIOPIA

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ABSTRACT

BACKGROUND: Most women have an average time to first postpartum ovulation of 45 days and can occur as early as 25 postpartum days (1). However, many women do not recognize that they are at a risk of pregnancy during this period. Most postnatal women are exposed to pregnancy by seven to nine months after delivery (2).

OBJECTIVES: To assess the prevalence of timely initiation of postpartum modern contraceptive utilization and associated factors among women in child bearing age in Arba Minch Town health facilities.

METHOD: An institutional based cross-sectional study was employed using pre-tested interviewer administered questions; 574 were interviewed. Systematic random sampling method was done from April 15 to May15, 2020. Bivariate and multivariate logistic regression analysis was done. P-value < 0.05 was used to consider as statically significant variables.

RESULTS: The magnitude of timely initiation of postpartum contraceptive utilization was found to be 260 out of 574 women (45.3%) 95% [CI: 40.1-49.0].Educational level of respondents , (AOR=0.46; 95% [CI: 0.31-0.71], number of ANC visit [AOR=2.913,95% [CI:1.39-6.07], counseling of postpartum family planning after the last delivery (AOR=2.29,95% [CI:1.46-3.58], couple discussed (AOR=4.94,95%[CI:3.01-8.09], resumption of sexual intercourse (AOR=1.74, 95% [CI: 1.36-2.77] and return of menses (AOR=(6.6, 95% [CI:1.91-22.78) were significantly associated variables with timely initiation of postpartum contraceptive utilization.

CONCLUSION: Timely initiation of modern contraceptive use in Arba Minch Town is observed in fewer than 50% of study participants. Therefore, it is crucial for the family planning program to actively integrate contraceptive education and services into antenatal and postnatal follow-up care.

KEYWORD: Timely initiation, modern contraceptive, postpartum contraception, contraceptive utilization,women of childbearing age

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INTRODUCTION

After giving birth, most women experience their first postpartum ovulation around 45 days, but it can happen as early as 25 days[1]. Unfortunately, many women are unaware that they could become pregnant during this time[2]. A significant portion of women who have recently given birth are at risk of pregnancy within seven to nine months, without using any contraception. These women have typically resumed their menstrual cycles, are sexually active, and are not using any birth control methods, thus increasing their chances of unintended pregnancy[2]. Pregnancy can increase the mother's risk of complications such as spontaneous abortion, postpartum bleeding, and anemia. Additionally, the newborn may be born with low birth weight or prematurely. Furthermore, the existing child may not receive sufficient care and support, making them vulnerable to disease and malnutrition[1, 3].

Ethiopia has introduced various programs and initiatives with the goal of improving the access and utilization of maternal health services. These services, including family planning, antenatal care (ANC), facility-based delivery, and postnatal care (PNC), are provided free of charge to the public. The Federal Ministry of Health (FMOH) has set an objective to increase contraceptive adoption from 42% to 55% within the general population by 2020. However, there remains a persistent issue of underutilized contraceptives, and the underlying causes of these gaps are not well understood. This highlights the necessity for a thorough investigation in Ethiopia.[1] Furthermore, in Ethiopia, despite the well-documented health benefits of initiating post-partum contraceptive use at the appropriate time to enhance maternal and child health, little attention has been given to the timing of contraception initiation, and there is limited knowledge regarding the practices and factors that influence the utilization of this service at the recommended time[2].

Therefore, the objective of this study was to assess timely initiation of modern contraceptive and identify associated factors among postpartum women in Arba Minch Town health facilities.

These findings could help planners, programmers, and decision makers to have insight about factors affecting timely initiation of postpartum modern contraceptive utilization

METHODS AND MATERIALS

Institutional based cross-sectional study design was conducted from April 2020 to May 2020 in Arba Minch town, which is located in Gamo Zone, 505 km to the south of Addis Ababa. (2017).

Arba Minch town has four health facilities, one general hospital, and three health centers.

Women who gave birth within one year of Menses came to selected health facilities with their infants for immunization, postpartum care, or sick child health care in selected Arba Minch health facilities were included.

The required sample size was determined using a single population formula, which yielded a result of 522. This calculation accounted for a 10% non-response rate. To ensure an adequate sample size after factoring in non-responses, the total sample size was calculated to be 574.

Data was collected from the women by using structured interviewer administered questionnaire which was adapted from different literature

The collected questionnaire was checked manually for its completeness, coded, and entered into epi Info version 7.0 Statistical package, then exported to SPSS version 21.0 for further analysis.. Both bivariate and multivariate logistic regression analysis was used.

RESULT

Socio-demographic characteristics of respondents

In this study 574 respondents were interviewed with a 100% response rate. The mean age of the respondents was 27.8 (SD ±5.9) with the minimum and the maximum age of 18 and 44 years respectively. Almost all 565 (98.1%) of the respondents were married and Approximately 50.9% of the respondents identified as Orthodox religion

followers, 40% as Protestant, and 1.6% as Catholic religion followers. Regarding educational status of the respondents, 416 (72.5%) had secondary and above educational level, 158 (27.5%) had primary and below educational status. More than half 308 (53.7%) of respondents were from Gamo ethnicity. Regarding occupation, 215 (37.5%) respondents were house wife, and almost all (96.9%) respondents were living in Arba Minch town (Table2)

Table 2: Socio-demographic and economic characteristics of respondent towards timely initiation of modern contraceptive utilization in public health facilities of Arba Minch Town, Gamo Zone, Southern Ethiopia 2020

Variables (N=574)	Category	Frequency	Percent (%)
Age	< 20	65	11.3
	21-30	304	53.0
	31-40	180	31.4
	>40	25	4.4
Ethnicity	Gamo	308	53.7
	Wolayta	78	13.6
	Gofa	34	5.9
	Other	154	26.8
Religion	Orthodox	290	50.9
	Protestant	235	40.9
	Muslim	40	7.00
	Catholic	9	1.6
Educational level of respondent	Primary and below	158	27.5
	Secondary and above	416	72.5
Occupation	House wife	215	37.5
	Government employee	165	28.7
	Daily labor	112	19.5
	Student	56	9.8
	Merchant	21	3.7
	Un employee	5	0.9
Marital status of respondents	Single	5	0.9
	Married	563	98.1
	Others	6	1.0
Place of residence	Arba Minch	556	96.9
	Out of Arba Minch	18	3.13

Characteristics of maternal health service utilization

Regarding the characteristics of maternal health service utilization, the majority 557(97%) of respondents had attended at least one antenatal care during their last pregnancy. More than two thirds, 509 (88.7%) of them had two or more ANC visits; more than half 349 (60.8%) received FP counsel at ANC visit during last pregnancy, and nearly two thirds 420 (73%) of women received contraceptive counseling after delivery. The majority (98.1%) of respondents had their last birth at a health institution.

Characteristics of sexual and reproductive health of respondents

Regarding the reproductive and sexual characteristics of respondents, 202 (35.2%) of them had only one living child and 372(64.8%) of them had two or more children. The majority 548 (95.5%) of respondents had not had menses after their last delivery.194 (33.8%) wanted to space the next pregnancy for two or more years, and 380 (66.2%) of them wanted to limit their number of pregnancies'. The majority 527 (91.8%) of them decided their number of children together. More than half 335 (58.4%) of the study participants started sexual intercourse at postpartum period and the majority of them 452 (78.7%) of respondents discussed contraceptives with their partner.

Level of Knowledge and attitude on modern contraceptive

From the overall participants 289 (51%) of the respondents were knowledgeable on timely initiation of modern contraceptive method (MCMs). Health institution were the predominant source of information 423 (73.3%), r followed by 399 (69.5%) from mass media, and 344 (59%) friends and neighbors. Almost all (98.6%) of the respondents knew at least one MCM. Injection (84.8%) and implant (82.9) were those most mentioned MCMs by the respondents.

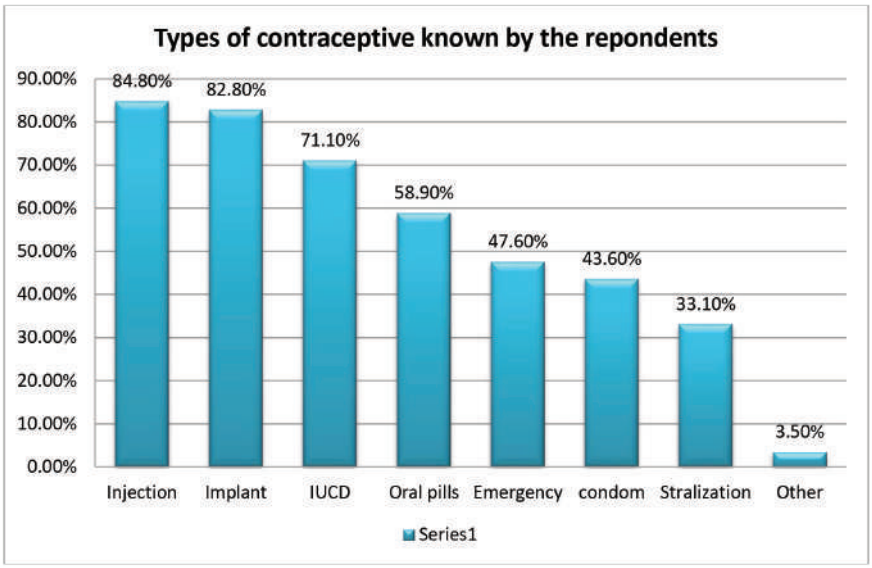

Figure 3: Types of modern contraceptive methods know by respondents in public health facilities of Arba Minch town, Gamo zone, Southern Ethiopia, June 2020.

Timely initiation of modern postpartum contraceptive utilization

The timely initiation of postpartum modern family planning utilization was 260, representing 45.3% of the total with a 95% [CI 41.1 to 49.5]. A total of 314 participants, or 54.7%, did not intend to initiate postpartum contraceptive usage on the recommended schedule. The reason for not initiating were, waiting for menses return, avoid sex (9.4%), breast feeding (8.2%), living alone (6.4%),fear of side effect(5.1%), husband opposed(4.7%), experienced problem of previous contraceptive use(2.8%) and others(2.6%) In relation to the choice of contraceptive methods, majority of the contraceptive users were using Implant (53.80%) followed by Injectable (30.40%).

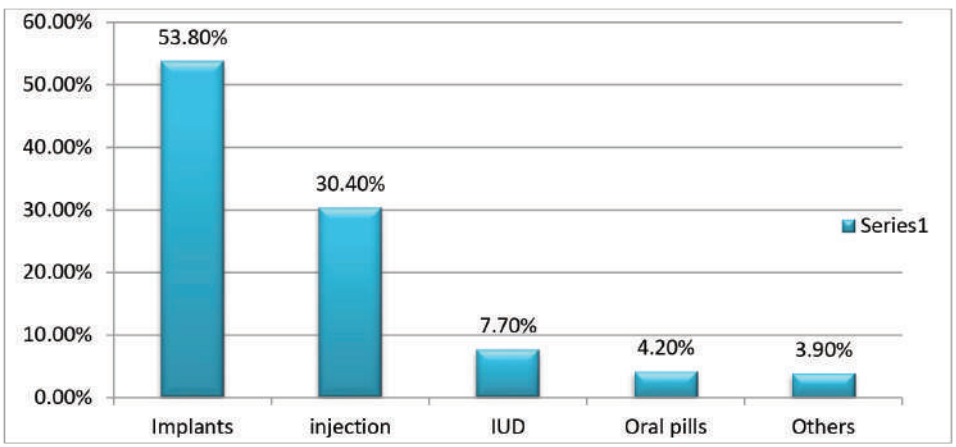

Figure 4: Timely initiations on types of modern contraceptive utilization at Arba Minch Town health facilities Gamo Zone, Ethiopia, 2020.

Factors associated with timely initiation of postpartum contraceptive utilization

In the Bivariate analysis significant association was observed between the educational levels of respondent, attitude, number of ANC visits, parity, number of living child, fertility desire, counseling on contraceptive after last delivery, return of menses, resumption of sexual activity, and spousal discussion on FP at P < 0.25. After adjusting the effect of confounding variables using multivariable logistic regression, variables like educational level of respondents, number of ANC visits, counseling on contraceptive after last delivery, return of menses, resumption of sexual activity and spousal discussion on FP was statically significant with timely initiation of modern contraceptive utilization (at P<0.05).

Mothers' educational status showed statistically significant association with postpartum family planning use. Mothers who had primary and below educational level had 53% reduced odds to utilize postpartum contraception than those who had secondary and above educational level (AOR=0.46; 95% [CI: 0.31-0.71].

Women who had frequent ANC visits, were 2.9 times (AOR=2.91, 95% [CI: 1.39-6.07] more likely to utilize as compared to women who had less frequent ANC visit. Mothers who got counsel after delivery were 2.3 times (AOR=2.29, 95% [CI: 1.46-3.58] more likely to initiate PPFP utilization. Women who discussed about FP utilization with their partners were 4.9 times (AOR=4.94, 95% [CI: 3.01-8.09] more likely to initiate at recommended time than their counterparts. Those mothers who had menses return after last deliveries were 6.6 times (AOR=6.6, 95% [CI: 1.912, 22.78] more likely to initiated PPFP than those with the absence of menses return. Women who started sexual intercourse after last delivery were 1.9 times (AOR=1.94 95% [CI: 1.361, 2.77] more likely to intend PPFP at recommended time.

Table 5: Bivariate and Multivariable analysis for factors associated with timely initiation of postpartum contraceptive in public health facilities of Arba Minch Town, Gamo Zone, Southern Ethiopia, 2020.

Variables	Yes Frq (%)	No Frq (%)	COR(CI)	AOR1(CI)	P-Value
Educational level					
Primary and below	51(19.6)	107 (34.1)	0.47(0.32-0.69)	0.46(0.31-0.71)	0.001*
Secondary and above	209(80.4)	207(65.9)	1	1	
Level of Attitude					
Good	158(60.8)	214 (68.2)	0.72(0.51- 1.02)	0.75(0.51-1.116)	0.158
Poor	102(39.2)	100 (31.8)	1	1	
No of ANC visit					
0-1	11(4.2)	54(17.2)	1	1	
> 2	249(95.8)	260(82.8)	4.70(2.403-9.19)	2.91(1.39-6.07)	0.004*
Parity					
1-2	103(39.6)	101(32.2)	1.38(0.98-1.95)	1.24(0.733-2.11)	0.421
> 3	157(60.4)	213(67.8)	1	1	
Number of living child					
One child	88(33.8)	114(36.3)	1	1	
>=2 child	172(66.2)	200(63.7)	1.114(0.78-1.57)	0.86(0.54-1.39)	0.55
Fertility desire					
Want to limit	171(65.8)	209 (66. 6)	0.96 (0.68-1.36)	0.79(0.513, 1.23)	0.301
Want to space	89(34.2)	105(33.4)	1	1	
Return of menses					
Yes	257(98.8)	291(92.7)	6.77(2.01, 22.18)	6.6(1.91, 22.78)*	0.003*
No	3 (1.2)	23(7.3)	1	1	
Resumption of sexual activity					
Yes	129(22.5)	110(19.2)	1.82 (1.31, 2.55)	1.74 (1.191, 2.53)*	0.004*
No	131(22.8)	204(35.5)	1	1	
Couple discussion					
Yes	94(16.4)	28(4.9))	5.78(3.64-9.12)	4.94(3.012-8.09)*	0.000*
No	166(28.9)	286(49.8)	1	1	
Counsel on PPFP after last delivery					
Yes	214(37.3)	206(35.9)	2.43(1.64,3.62)	2.29(1.46-3.58)*	0.000*
No	46(8.0)	108(18.8)	1	1	

* = Statically significant at p-value<0.05, 1= Reference point

DISCUSSION

The magnitude of timely initiation of postpartum contraceptive utilization was found to be 260 (45.3%). The findings of this study are comparable with a study done in Debere Birhan of 46.9%, Gojam with 46.7%, and Gonder with 45.8%,[4,5, 6]. It also comparable with study done in India of 49%, Nigeria 44%, and Kenya at 45%[7,8, 9].However; this finding was higher than the findings of similar studies previously done in Ethiopia Sebata Hawas district 38.6%[10] , finote Selam 37%[6] Bale zone 20.8 %,[11] Aroressa 32%[2], Dabat 32.5 %[3], Somalia 12.3 %,[12]. It was also higher than study done in Nepal, 37%[13] Uganda 39%,[14] and Ghana 30.7%[15]. This finding is also supported by other studies done in Ethiopia[16,17,18].However, this finding was found to be lower than study done in Northern, Ethiopia Tigeria, 84.3%, Somalia 86.3% and southern Ethiopia Hossana, 72.9% [19,20,21]. It is also lower than Malawi 75%[22]. The possible explanation for this variation might be due to different socio demographic factors, like economic and educational status of respondents in the area. Other reason might be due to geographical variation.

This study showed that most of the contraceptive users (53.8%) were using implant, 30.4% inject able, and 7.7% IUD type of contraceptive methods. This predominant method was accounted in most previous studies [23,16, 24, 17, 2,7, 25]. The reason may be due to its convenience of not being taken on daily basis, and the availability of these methods. An Additionally, in this study most of respondents said they "heard it is good". .

Educational attainment is found to be an important predictor of modern contraceptive use. In this study, mothers who had primary and below educational level had 53% reduced odds to timely initiation of PPFP than those who had secondary and above educational level (AOR=0.46; 95% [CI: 0.31-0.71]. This was similar with the studies conducted in most developing countries [3,1,2,26, 2,24,24, 25, 11, 26].

In this study, only 19.6 % of women with primary and below educational level reported current use of any method of MCM, compared with 80.4 % of women with secondary and above educational level. This can be explained by the idea that women with better educational level have better access to health care information, have greater autonomy to make decisions, and have greater ability to use quality health care services. The idea was supported by most studies conducted in Ethiopia[16, 21,33,27,28,18,30,334].

Women who had two or more ANC visits during last pregnancy were 2.9 times more likely to initiate the postpartum contraceptive utilization at recommended time than those who had less than two ANC visits. Possible explanations might be women who attended continuous follow up of antenatal care clinic during pregnancy may have more information and were strongly counseled by health care providers on benefits of family planning up take, and may be more likely to be informed and aware about complications that may occur after delivery. These factors can increase their initiation[32,12]

Those mothers who got counsel about utilization of contraceptive after delivery were 2.3 times more likely to initiate contraceptive utilization than counterparts. This might be due to women who were counseled during delivery and after delivery would informed the importance of having birth spacing for both the mother and new born. This finding is highly supported by other studies completed in Ethiopia[35, 16, 12]. A study in Mekelle showed women who received counseling on family planning had significantly greater odds of using modern postpartum contraceptives compared to those who did not (adjusted odds ratio [AOR] = 10.157). The difference may be because of the quality of counseling or the socio-demographic characteristics of the women.[36]

Postpartum women who have discussed with their husbands on contraceptive methods were 4.9 times more likely to initiate postpartum contraceptive utilization on time than those who had never discussed. The possible explanation for this might be that women can get more information and

support to utilize maternal health services through discussing with their spouses, so this might increase their initiation to timely contraceptive methods. This is also supported by other studies in Ethiopia [37,25, 21,6,38], Malawi[22], and Ghana[14,39].

Women whose menses returned after last delivery were 6.6 times more likely to initiate PPMC at recommended time than those who had not seen menses after their last delivery. This finding is also supported by other studies done in Axum[19], Gonder[6], Gojam[33], and Hossana[20], and also supported by studies in India[7] and Ghana[16, 39]. This might be explained by the fact that postpartum women whose menses returned after delivery may assume that they are at risk of getting pregnancy.

Women who started sexual intercourse at postpartum period were 1.9 times more likely to utilize PPFM. This might be due to the fact that women who resumed sexual activity have a fear of getting pregnant. This finding is supported by other studies done in Hadiya Zone, Hossana Town[21], and Tigray region Axum Town[19].

CONCLUSION

In 2020, a comprehensive study in Arba Minch Town, Southern Ethiopia, involving 574 respondents examined socio-demographic characteristics, maternal health service utilization, and sexual and reproductive health in the context of postpartum modern contraceptive usage in public health facilities. Key findings included a relatively young population, mostly married with diverse educational backgrounds, and varied religious affiliations, primarily Orthodox and Protestant. The study showed positive trends in maternal health service utilization, indicating growing awareness of timely postpartum contraceptive use. Respondents expressed preferences to limit and space pregnancies, with good knowledge and positive attitudes toward modern contraceptive methods. The study underscores the need for ongoing efforts to enhance family planning services and tailored interventions to improve reproductive health outcomes. Additional research is warranted to explore the barriers hindering the prompt initiation of contraceptives. This research should actively engage the local community in order to address their unique requirements effectively, particularly during the postpartum phase. This collaborative approach can yield valuable insights for customizing interventions to cater to the distinct needs of the community.

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PREMENSTRUAL DISORDERS (PMS AND PMDD) INCIDENCE, AND ITS PREDICTORS IN IRANIAN MEDICAL UNIVERSITY STUDENTS; AN EXPLANATORY CROSS-SECTIONAL STUDY

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ABSTRACT

INTRODUCTION: Premenstrual disorders are a wide range of physical, behavioral, and psychological symptoms that emerge before menstruation and in the first initial days of menstruation which repeat in several cycles. This study aimed to evaluate the Premenstrual syndrome (PMS) and Premenstrual dysphoric disorder (PMDD) incidence and its related factors among Iranian medical students.

MATERIALS AND METHODS: In a cross-sectional study, 264 students of Qom University of Medical Sciences were selected by stratified proportional to size and simple random sampling method. Demographic form, Premenstrual Symptoms Screening Tool (PSST), and Daily Record of Severity of Problems (DRSP) questionnaires were used for data collection and evaluation of subjects for PMS and PMMD according to the DSM-IV criteria. Data analysis was conducted using SPSS version 20 (SPSS Inc., Chicago, IL, USA) by Chi-square, independent t-test, and multivariable logistic regression. P-value lower than 0.05 was considered as significant.

RESULTS: The mean age of subjects was 21.05±2.20 years and 38.6%, (CI 95%: 32.6%-44.7%) were diagnosed with PMS; 8%, (CI 95%: 4.9%-11.4%) were labeled withPMMD. Decreased interest in daily activities (60.6%), depressed mood (60.2%), fatigue/lack of energy (52.3%), and difficulty concentrating (51.1%) were the most common PMS symptoms. Bivariate analysis showed that BMI, marital status, chronic disease history, and continuous use of medication had significant relationship with PMS morbidity. Marriage 2.1 (OR=2.1, 95% CI: 1.12-4.42) and stress in the last 3 months (OR=2.38, 95% CI: 1.23-4.63) were the two most important predictors of PMS in medical students based on multivariate logistic regression.

CONCLUSION: Decreasing the student's stress, especially in students with chronic disease history that have continuous medication consumption could be effective factor for controlling the PMS symptoms. Moreover, educational stress and higher familial stress in married students, due to socioeconomic and cultural factors, are the related predictive determinants of PMS. Change in lifestyle by rest taking and enough sleep, as well as counseling could help the affected subjects.

KEYWORDS: Premenstrual disorders, Premenstrual syndrome, gynecologic disorders, students, girls, women

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INTRODUCTION

Premenstrual syndrome (PMS) is one of the most common gynecologic disorders in the menstrual cycle in women of reproductive age, which causes work absence and a decline in social activity.[1, 2] The prevalence of PMS is varied from 26.1% to 70%. In addition, Premenstrual dysphoric disorder (PMDD) prevalence is 10% to 30% among different regions and ethnicities based on different assessment tools[1-5]. PMDD is severe form of PMS defined by cognitive–affective and physical symptoms in the week before menses and affects millions of women worldwide[6]. The PMS/PMMD symptoms are a wide range of physical, behavioral, and psychological symptoms that emerge before menstruation and in the first initial days of menstruation which repeat in several cycles[7-9]. Body aches, bloating, joint or back pain, and depression feeling anxiety, and panic attacks are the most common physical and psychological symptoms.[2, 10] These symptoms are the cause of many problems, including physical problems,, mental health disorders, and severe functional deficiencies in familial and professional relations, productivity, social and occupational activities of women[2, 7]. All these impairments are related to the reduction of job efficiency and increase in absenteeism, as well as a factor in economic losses[2].

According to recent studies, lower PMS prevalence is related to lower stress and physical exercise[2]. Lifestyle factors such as food intake and physical activity are important factors of PMS/PMDD, especially in young, professional, and urban women.[7, 10] Moreover, cultural factors are probably related factors for symptom expression. Nevertheless, there has been agreement about related demographic and sociocultural factors of PMS. PMS incidence and its severity could be an effective factor in students' relationships, social activities, job efficiency, quality of life, and lower positive academic performance as well as lower frontal rest asymmetry scores[2, 3, 11]. These impairments are associated with reward processing dysfunction, lower productivity, and interference with studies[11]. However, the first step for awareness of PMS incidence and its severity is the first phase of prevention and management of this disorder. Despite its prevalence, relatively little is known about PMS and PMDD in the Iranian population. Therefore, the current study aimed to examine the incidence of premenstrual disorders (PMS and PMDD) and its related factors among Iranian medical students.

MATERIALS AND METHODS:

Study setting and subjects

This was an analytical explanatory cross-sectional study conducted in students of Qom University of Medical Sciences, in one of the central megacities in Iran in 2022. Sample size calculation was based on the results of recent studies and the PMS prevalence was considered as 47.8% [12], type one error equal 5%, and the precision (d=0.06). Therefore, the minimum required sample size was estimated as 260. The study questionnaires were distributed among 280 eligible medical students and finally 264 subjects filled the questionnaires completely.The response rate was 94.28%. Stratified proportional to size method and simple random sampling method were used to select a random sample from female students from different strata. College of students were considered as strata and in each stratum, the eligible subjects were selected based on the simple random sampling method. Eligibility and inclusion criteria were those studying at Qom University of Medical Sciences, age between 19-26 years, having informed consent for participating in the study and regular menstrual period and normal bleeding duration. Pregnancy, abnormal uterine bleeding, continuous usage of medication for depression and blood pressure, and women's hormonal drugs were exclusion criteria.

Data collection and measurements

Data collection was conducted by two different questionnaires including demographic characteristics form and two different scales for PMS and PMDD evaluation. The demographic form contains the age, weight, BMI, marital status,

residential place, educational level, and college, as well as the number of menstrual days.

Premenstrual Symptoms Screening Tool (PSST) and Daily Record of Severity of Problems (DRSP)[13] questionnaires were used for diagnosis and evaluation of subjects for PMS and PMMD according to the DSM-IV criteria[5, 14, 15]. According to the scoring system of the PSST questionnaire, subjects who have at least five symptoms during two menstrual periods from 7 days before the first day of menstrual bleeding and a maximum until 4 days after the starting of menstrual bleeding, are defined and diagnosed as PMS case [5, 14, 15]. PSST includes11 items that were developed by Steiner et al. which was used for diagnosis of the PMS(14). This tool is a valid and reliable tool that was modified for adolescents[15] as a fast and reliable tool for the evaluation of PMS in adolescents. The validity and reliability of these scales was shown in different studies [5, 13]. The reliability coefficient of the PSST questionnaire in this study was estimated as 0.805 (95% CI; 0.767-0.839) and 0.781(0.738-0.819) for DRSP based on Cronbach's Alpha. Each item in the PSST questionnaire is a four-point Likert scale that scored from 0=not at all, 1= mild, 2=moderate, and 3= severe). In addition, the subjects were assigned to three different categories according to the scoring symptom including 1) patients with no or mild/PMS, 2) moderate to severe PMS, and 3) patients with PMDD. The mild/no PMS group did not meet the PMS and PMDD criteria and consists of subjects with subthreshold symptoms[9, 15].

The primary outcome of this study was the occurrence and incidence of PMS and PMDD in study subjects. The score achieved from PSST and DRSP were the effect modifiers that modify the effects of main predictors (e.g. demographic variables). Therefore, the main predictors were demographic variables including age, BMI, marital status, residency area, and continuous use of medication. However, the history of chronic diseases, having stress during the last 3 months, and using traditional ways to reduce symptoms are potential confounders.

Ethical consideration

All subjects were informed about the study subject and verbal informed consent was taken from all of the eligible subjects. In addition, the study protocol was approved by the ethical committee of Qom University of Medical Sciences by IR.MUQ.REC.1400.208 at 2022.01.02.

Statistical analysis

The data was analyzed using SPSS version 20 (SPSS Inc., Chicago, IL, USA) by descriptive and inference analytical methods. The distribution of data in PSST and DRSP questionnaires was checked by Shapiro–Wilk and Kolmogorov–Smirnov test as well as a histogram chart. Due to the confirmation normality of data, the mean (Standard Deviation (SD)) was calculated for continuous variables and categorical variables were presented by frequency and percent. Bivariate analysis for categorical variables to assess the relationship between PMS and related factors was conducted by Chi-square. An independent t-test was used to compare the mean of difference between subjects with and without PMS. For controlling the confounder variables and effect modifiers, multivariable logistic regression was used by Wald forward manner. P-value lower than 0.05 was considered as significant.

Table 1: Demographic quantitative characteristics of students who participated in study

Minimum	Maximum	Mean (SD)	(%)
Age	18.00	33.00	21.05 (2.20)
BMI	15.19	32.74	22.18(3.38
Height	146.00	185.00	163.65(5.29
Weight	42.00	87.00	59.34(9.53)
Semester	1.00	12.00	4.20(2.26)
Number of menstrual days	1.00	10.00	6.56(1.51)

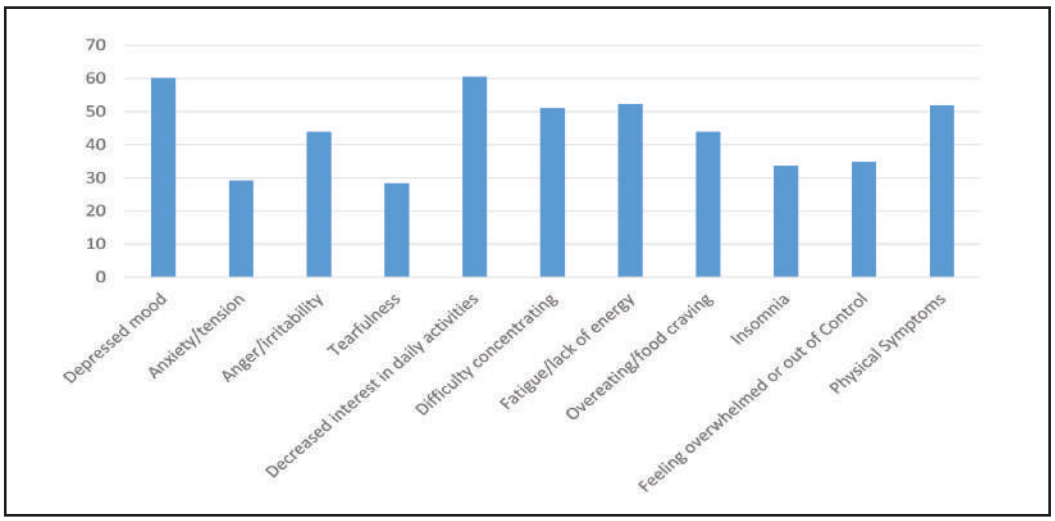

Figure 1. The frequency of PMS symptoms in studied students

RESULTS:

Totally 264 medical students were included. Based on Table 1, the mean age of subjects was 21.05±2.20 years and ranged from 18 to 26 years. According to Table 2, from all assessed students 102 (38.6%, CI 95%: 32.6%-44.7%) were assessed with PMS; 81 subjects (30.6%, CI 95%: 25.4%-36.4%) were moderate and 21 subjects (8%), (CI 95%: 4.9%-11.4%) were labeled as PMMD. Descriptive results in Table 2 showed that 22.3% (59 students) were overweight, 13.6% (36 students) were married, and 38.3% (101 students) lived in university dormitories. The chronic disease history, medication usage and stress during 3 last months were estimated among students as 15.5%, 10.6% and 18.6%, respectively. According to Figure 1, decreased interest in daily activities, depressed mood, fatigue/lack of energy, physical symptoms, and difficulty concentrating were the most common PMS symptoms.

The results of Chi-square test (Table 3) showed that BMI, marital status, chronic disease history, and continuous use of medication have a significant relationship with PMS morbidity. Based on our results in Table 3, PMS occurrence was higher in overweight students in comparison to other BMI

Table 2: Distribution of students based on qualitative demographic factors

Variables		n(%)
PMS morbidity	No	162 (61.4)
	Yes	102(38.6)
PMS Category	No/Mild	162 (61.4)
	Moderate	81(30.6)
	PMMD	21(8.0)
Age category	Lower 21	116(43.9)
	21-24	129(48.9)
	Higher 24	16(6.1)
BMI	lower weight	35(13.3)
	Normal	163(61.7)
	Over weight	59(22.3)
Marital status	Single	224(84.8)
	Married	36(13.6)
Residency	Native	157(59.5)
	non-native	101(38.3)
College	Medical	60(22.7)
	Paramedical	39(14.8)
	Dental	51(19.3)
	Health	55(20.8)
	Nursing & midwifery	53(20.0)
Chronic Disease	yes	41(15.5)
	no	216(81.8)
Continuous use of medication	Yes	28(10.6)
	No	227(86.0)
Stress in the last 3 months	yes	49(18.6)
	No	205(77.7)
The traditional way to reduce symptoms	yes	27(10.2)
	no	226(85.6)

Premenstrual syndrome (PMS), Premenstrual dysphoric disorder (PMDD

Table 3: The association of demographic variables with PMS occurrence in medical students

Variables		Yes, n(%)	No, n(%)	Chi Square	P Value*
Age	Lower 21	42(36.2)	74(63.8)	1.23	0.548
	21-24	51(39.5)	78(60.5)		
	Higher 24	8(50.0)	8(50.0)		
BMI	lower weight	9(25.7)	26(74.3)	6.88	0.032
	Normal	63(36.8)	108(63.2)		
	Over weight	30(51.7)	28(48.3)		
Marital status	Single	80(35.7)	144(64.3)	6.68	0.010
	Married	21(58.3)	15(14.7)		
Residency	Native	64(40.8)	93(59.2)	0.440	0.507
	non-native	37(36.6)	64(63.4)		
Chronic disease history	Yes	22(53.7)	19(46.3)	4.21	0.040
	No	79(36.6)	137(63.4)		
Continuous use of medication	Yes	16(57.1)	12(42.9)	4.44	0.035
	No	83(36.6)	144(63.4)		
Stress in the last 3 months	Yes	27(55.1)	22(44.9)	6.64	0.010
	No	72(35.1)	133(64.9)		

*Based on Chi Square test

Table 4: The mean difference of demographic characteristics between PMS and normal subjects

Variables	Normal (n=160)	PMS (n=101)	P Value‡
Age	21.08±2.29	20.99±2.07	0.740
BMI	22.41±3.18	21.75±3.07	0.010
Weight	57.22±9.53	59.34±9.59	0.423
Semester	4.27±2.26	4.10±2.26	0.556
Number of menstrual days	6.54±1.48	6.14±1.43	0.032

‡ Based on t-test

categories (51.7% Vs. 36.8% in normal and 25.7% in lower weight groups, P=0.032). Married students experienced PMS 58.3%, while the PMS in single students was 35.7%. (P=0.010). In addition, 53.7% of students with chronic disease history have PMS while in students without chronic disease history, the PMS occurrence was 36.6% (p=0.040). In addition, 57.1% of students who reported continuous usage of medication were diagnosed with PMS, in comparison to 36.6% of students without any medication usage (P=0.035). Stress in the last 3 months was significantly related to PMS and the PMS incidence was 55.1% in subjects with a stress history, while this rate was calculated as 35.1% for other subjects (p=0.010). Moreover, there was no observed significant relationship between PMS occurrence and student residential place (p=0.507), age group (P=0.548), educational grade (p=0.324), and college (p=0.468) of students with PMS.

According to Table 4, there was no observed significant difference in mean of age, weight, and educational semester between students in PMS and normal groups. Nevertheless, the menstrual duration in normal and PMS groups was estimated as 6.54±1.48 days and 6.14±1.43 days that was significantly different between the two groups (P=0.032).

Results of multivariate logistic regression (Table 5) showed that being married and stressed in the last 3 months were the two most important predictors of PMS in medical students. Married individuals had 2.1 times higher odds of having PMS (OR=2.1, 95% CI: 1.12-4.42).Having stress during the three last months increased the rate of PMS to 2.38 times (OR=2.38, 95% CI: 1.23-4.63).

Table 5- The results of multivariate logistic regression regarding the related factors of PMS after control for other confounder studied variables

		Beta coefficient	S.E. for Beta coefficient	Wald	P Value	Odds ratio (OR)	95% Confidence Interval for Odds ratio (OR)	
							Lower	Upper
Marital status	Single				1	-	-	
	Married	0.753	0.38	3.92	0.048	2.10	1.12	4.42
Stress in the	No				1	-	-	
last 3 months	Yes	0.868	0.34	6.55	0.010	2.38	1.23	4.63

Excluded variables form the model were residency, chronic disease history, BMI, age, number of menstrual days, and continuous use of medication

DISCUSSION:

The PMS and PMDD incidence was estimated as 38.6% and 8%, respectively, and stress and marriage were the two most important predictors of PMS. The prevalence of being overweight/ obese was 22.3%. Based on the review studies, the worldwide prevalence of PMS is 48% and in Iran, varies from 30% to 99.5%.[16, 17]. The PMS incidence varied among different studies from 37% in Indian medical[10] students to 64.9% in Saudi Arabia[3], and 75% in another study in Sabzevar,[7] Iran. In addition, another similar study showed the prevalence of PMS and PMDD 26.1% and 10.0% among young Turkish women, respectively based on the DSM-V criteria using PSST[5].

In Shrestha et al.'s study of students of a teaching hospital in Nepal, 72.3% reported at least one premenstrual syndrome symptom and 25.9% reported at least one severe symptom. Criteria of PMDD were observed in 2.1% and 17.2% were affected by moderate and severe PMS (18). In another cross-sectional study on 388 female medical students by Al-Shahrani et al. at Bisha University, Saudi Arabia, data were gathered by a self-administered Premenstrual Syndrome Scale (PSS). Their results showed that the PMS prevalence was 64.9%(3). In another study by Mishra of Indian medical students, the PMDD incidence was 37% and that higher rate of PMDD was observed in older and postgraduate students[10]. Our results were similar to students in India, but lower than Saudi Arabia.

Our results were close to Indian students[10], lower than Saudi Arabia[3], and lower than other recent studies in Iran.[16, 17] However, based on the study design and data collection methods, this study is succeptible to different biases including selection bias, information bias, and confounding bias. We tried to remove selection bias by using random sampling, but nonresponding subjects rising the probability of selection bias and due to the students with severe problems, were non-respondent subjects and the overall estimate of PMS and PMDD is underestimated. Moreover, the information bias may have occurred in the current study due to some religious considerations. All these biases are related to the underestimation of PMS and PMDD. However, we used multivariate logistic regression to remove the potential effects of confounder factors and minimize the effect of them in PMS occurrence. Based on our results, the PMS occurrence was 51.7% in students with BMI>25 in comparison

to 36.8% in normal BMI students. Similar results were obtained on other studies. In another study, obesity increased the risk of PMS nearly a three-fold increase risk compared to non-obese women (OR = 2.8)[19]. In addition, Bertone-Johnson et al.'s study showed that women with BMI ≥ 27.5 kg/m are at higher risk of PMS than women with BMI lower 20 kg/m after adjustment for other confounding variables such as age, smoking, and physical activity[20]. Moreover, in the results of Rad et al. study on female high school students in Sabzevar city, hip circumference, and body mass index were significant related factors of PMS.[7] However, different studies showed the relationship between PMS and hormonal abnormalities, mineral deficiencies, stress, smoking, certain dietary habits, and lack of exercise[21]

According to bivariate analysis, the stress in the last 3 months was significantly related to PMS and the PMS incidence was 55.1% in subjects with a stress history, while this rate was calculated as 35.1% for other subjects. In addition, continuous consumption of medication and chronic disease history were significant related factors of PMS. Nevertheless, multivariate logistic regression, after adjusting the confounding variables showed that stress condition during the three last months was the most important factor of PMS that increased the risk of PMS more than twofold. In addition, married women were at higher risk of PMS. This is probably associated with higher stress in married students due to distance from their husbands, dormitory difficulties, and unknown future in their life due to socioeconomic problems. Similar results showed by Arafa et al.'s study that married Egyptian girls were at a higher risk of PMS[21]. Karimiankakolaki et al.'s study in Iran showed that marital dissatisfaction is a more common problem in women with PMS[22]. Nevertheless, another study showed that single women experience PMS symptoms more[23]. However, according to some large cohort and longitudinal studies, a significant relationship between stress exposure history such as trauma history, emotional and childhood physical abuse as well as work or daily living stress with PMS/PMDD is demonstrated[24-26].

According to our results, decreased interest in daily activities, depressed mood, fatigue/lack of energy, physical symptoms, and difficulty concentrating were the most common PMS symptoms. In Daşıkan et al.'s study in Turkish young women anger/irritability was the most common symptoms that occurred in 97.4% of subjects[5], while in another study, anxiety (78.8%), stomachache (72.2%), and skin spot and ache (29.6%) were the common symptoms before and during menstruation period[8]. However, the PMS complaints are negatively affecting the familial conditions and social amalgamation of the affected students.[8] The results of recent studies showed that PMS was related to daily activities, quality of life, homework, and their learning environment[3]. In addition, PMDD is significantly associated with lifestyle factors including sleep, physical activity, and food intake under stress.[10]. However, modification in lifestyle such as decreasing daily stress by increasing physical activity and consumption of healthy food, could be a reliable approach for PMS/PMDD management[10, 21].

Our results could be generalizable to all other female students in Iran due to the random selection of the subjects and the high response rate of participants. These findings suggest that PMS and PMDD are significant issues in Iran and that the prevalence has largely been underestimated due to a lack of awareness and understanding of the condition. Additionally, the identified predictors highlight potential risk factors for the development of PMS and PMDD. It is important that these findings are taken into account in the development of interventions designed to mitigate the impact of PMS and PMDD. Further research is needed to gain a better understanding of PMS and PMDD in the Iranian population and identify effective strategies for the prevention and treatment of PMS and PMDD in Iran.

LIMITATIONS:

This study could estimate the PMS/PMMD incidence among medical students in one of the most religious cities of Iran for the first time. Nevertheless, we cannot assess the effect of a healthy lifestyle and its components on the PMS incidence. Moreover, the causality cannot assess in cross-sectional study and the effect of PMS on quality of life did not determine in current study. Therefore, prospective studies of women in different socioeconomic and cultural classes with adequate sample size are suggested to validate these findings.

CONCLUSION:

According to our results, decreasing the student's stress, especially in students with chronic disease history that have continuous medication consumption could be effective factor for controlling or declining PMS symptoms. Moreover, educational stress and higher familial stress in married students due to socioeconomic and cultural factors, are the related predictive determinants of PMS. Therefore, among medical students, the change or balancing of modifiable risk factors should be considered as the critical intervention programs. Health education for a good lifestyle, rest taking and enough sleep, counseling and appropriate medical treatment could help the affected subjects.

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SEXUAL AND REPRODUCTIVE HEALTH SERVICES UTILIZATION AMONG ADOLESCENTS IN SOUTH ETHIOPIA: EXAMINING THE ROLE OF STIGMA, SOCIAL SUPPORT, AND SELF-EFFICACY

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ABSTRACT

INTRODUCTION: Despite the high burden of sexual and reproductive health (SRH) during adolescence and it associated negative consequences, relatively little attention has been given to the role of stigma, social support, and self-efficacy in adolescents' SRH services utilization. Therefore, this study aimed to examine the role of stigma, social support, and self-efficacy in adolescents' SRH services utilization in South Ethiopia.

METHODS: A total of 1172 adolescents were selected using a multi-stage stratified random sampling method. Correlation analysis was performed to identify relationships between the variables. A structural equation model was used to examine the chain and single mediating roles of self-efficacy and perceived social support.

RESULTS: This study found that the direct, indirect, and overall effects of SRH-related stigma on the utilization of SRH services were significant. A single mediation effect via perceived social support was -0.0017 [bootstrap 95% CI: -0.0026, -0.0007] and self-efficacy was -0.00123 [bootstrap 95% CI: (-0.0023, -0.0002)] in the association between SRH service utilization and SRH-related stigma. The chain mediation effect test showed that perceived social support and self-efficacy mediated the effect of SRH-related stigma on SRH service utilization, with a mediation effect score of -0.0025 [bootstrap 95% CI: (-0 .0034, -0.0015)].

CONCLUSION: The association between SRH-related stigma and SRH service utilization was partially mediated by self-efficacy and perceived social support. The chain mediation effect test also confirmed that perceived social support and self-efficacy sequentially mediated the effect of SRH-related stigma on SRH service utilization. Therefore, designing comprehensive interventions that target "3S" stigma, social support, and self-efficacy may be effective in improving service utilization.

KEYWORDS: Adolescents; Sexual and Reproductive Health Service; Stigma; Self-efficacy, Perceived social support; South Ethiopia.

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INTRODUCTION

According to the World Health Organization (WHO), adolescence is 10 to 19 years, which is called the transition from childhood to adulthood[1]. This age is also known as the crucial stage of development and is the foundation for good health[2]. SRH and well-being are recognized as important components of overall health and development[3]. Recent studies have shown that engagement in risky behaviors is increasing[4, 5].

Globally, there are 1.3 billion adolescents[6]. In Ethiopia, adolescents comprise 23% of the total population [6]. However, more than 3,000 adolescents die every day worldwide, mostly from preventable or curable causes such as unwanted pregnancy, unsafe abortion, and sexually transmitted infections (STIs), including HIV/AIDS[6]. Evidence suggests that these problems can be easily prevented or treated through SRH services[7]. However, the utilization of these services among adolescents remains low[8, 9]. For example, recent studies in Ethiopia showed that the utilization of SRH services among adolescents ranges from 8.6% to 39.5%[10-13].

SRH-related stigma further limits the utilization of SRH services and contributes to poor SRH outcomes[14].

Stigma related to SRH poses a major public health threat to adolescents[15]. Previous empirical study findings demonstrated that there is an inverse association between SRH-related stigma and adolescents' use of SRH services services[13,14,16]. It has also been found that stigma significantly decreases (limits) the level of social support among adolescents[17]. Likewise, some studies have consistently confirmed that Perceived Social Support (PSS) increases overall self-efficacy and directly influences adolescent behavior or indirectly predicts adolescent behavior via self-efficacy[18,19]. Furthermore, empirical study findings demonstrate that self-efficacy and PSS play a mediating role. For instance, Chang et al. reported that PSS plays a mediating role in the relationship between depressive symptoms and perceived stigma among individuals with substance use disorders[20]. Tao et al. reported that PSS and self-efficacy were sequential mediators in the relationship between HIV self-management and HIV-related stigma[21].

However, most studies have focused on adolescents' mental health issues[18, 20, 22, 23]. There is little research evidence on these aspects of adolescent SRH. Therefore, this study aimed to examine the chain and single mediation role of self-efficacy and PSS in the association between SRH-related stigma and SRH service utilization among adolescents in South Ethiopia. Based on prior studies, we proposed the following three hypotheses. First, PSS played a mediating role in the association between SRH-related stigma and SRH service utilization. Second, self-efficacy played a mediating role in the association between SRH-related stigma and SRH service utilization. Third, PSS and self-efficacy sequentially mediated the association between SRH-related stigma and SRH service utilization among adolescents.

METHOD AND MATERIALS

Study design and setting

A community-based cross-sectional study was conducted in Gamo zone of South Ethiopia Regional State from March 2 to April 9, 2023.

Population

The source population was comprised of all households with adolescents and residents in the study area. All randomly selected households that had adolescents (10-19 years old) and permanent residents in the selected study area were the study population. However, those adolescents who had known hearing or mental impairment and/or were critically ill during data collection were excluded from this study.

Sample size determination

The sample size was calculated using the formula for a single population proportion with the following assumptions:95% CI level, 80% power, design effect of 2, margin of error of 4% (d=0.04), 80% power, and proportion of SRH services utilization of 33.8% taken from study conducted in Central

Ethiopia[10].The calculated sample size was 1074. After adding a non-response rate of 10%, the final sample size was 1181. To select study participants a multistage stratified sampling technique was used.

Measurement

SRH-service utilization was measured by asking adolescents whether they used SRH-service within the last 12 months from nearby health institutions, which was dichotomized into two groups. Based on the Nairobi Summit (ICPD+25) essential packages of SRH services for adolescents using the life course approach were used to measure SRH services utilization[24]. The essential package of services includes modern contraceptive services, maternal and newborn care, VCT services, safe abortion and post-abortion care services, and STI diagnosis and treatment services within the last 12 months[24]. If the adolescents utilized at least one item, it was considered positive ("yes") response was coded as "1" and "No" was coded as "0."

Sexual and Reproductive Health Stigma: This was measured using 20 questions, adapted from the Adolescent SRH-related Stigma Scale. It has three subscales: enacted stigma (seven questions), internalized stigmatization (six questions), and stigmatizing lay attitudes (seven questions). Each question used a three-point Likert scale (1 = disagree, 2= neutral, and 3 = agree). We recoded (disagree and neutral to '0' and agree to '1' [14]. Then each question was summed to obtain the total score. It ranges from 0-20. Higher scores indicate higher perceived stigma[14].

Perceived social support (PSS): This was measured using 12-item questions, adapted from the Multidimensional Scale of PSS[25]. It has three subscales: perceived family support (four items), friend support (four items), and other support (four items). Each item uses a seven-point Likert scale (from 1 (very strongly disagree) to 7 (very strongly agree). Each item was summed to obtain the total score. The higher the total score, the higher the PSS.

Adolescent Self-Efficacy: It was measured using 10-item questions adapted from the General Self-Efficacy Scale[26]. The scale has four points, from 1(completely incorrect) to 4 (completely correct)[26]. Each item was summed to obtain the total score. The higher the total score, the higher self-efficacy.

Data Collection Procedure

The data collection was performed by 12 health professionals and three supervisors with master's degrees in public health tp supervise the data collection. The data collection questionnaires were adapted from the Global Early Adolescent interview surveys, the WHO illustrative questionnaire, and the review of previous studies[13, 14, 25, 26].The questionnaire was initially prepared in English and translated into the local language. The local language (Amharic) version of the questionnaire was used for the final data collection. Male participants were interviewed by male data collectors, and female by female data collectors. Less sensitive questions were asked before the more sensitive ones. The Kobo Toolbox software was used to collect the data. The principal investigator and supervisors oversaw the entire data collection process and checked the data for completeness daily. Extensive training was provided to data collectors and supervisors. The pre-test was conducted on 5% (60 adolescents) of the participants in Chencha District. The field supervisors checked the completeness of the questionnaires before the data collectors were sent to the center. In addition, the principal investigator regularly reviewed the files sent to the center by each data collector.

Data Analysis and Management

The data were cleaned, processed, and analyzed using STATA version 14.0. Descriptive statistics, such as frequencies, percentages, means, and standard deviations, were calculated and presented using detailed text narratives, graphs, and tables. The reliability of the measurements was verified using Cronbach's α for each composite variable. Pearson correlation analyses were conducted to test the association between variables. A structural equation model was used to examine the chain and single mediating roles of self-efficacy and PSS. The mediating effect was significant when the 95%

confidence interval did not include zero. A p-value of 0.05 (two-tailed) was considered statistically significant.

Ethical consideration

The Wolaita Sodo University Institutional Research Review Committee (IRRC) granted ethical approval for this study on February 9, 2023 (Project Reference Number: WSU-IRRC/004/2023). An official letter of permission was obtained from the Gamo Zone health department. Before the actual data collection, written informed consent was obtained from each participant. For participants under 18 years of age, assent was obtained from the study participants, and written informed consent was obtained from their parent/legal guardian.

RESULTS

Socio-demographic characteristics of adolescents

A total of 1172 adolescents took part in the study with a response rate of 99.24%. The proportion of adolescents aged 15 to 19 was 675 (57.6%). More than half (56.1%) of the respondents were female and 1022 (87.2%) of the adolescents were enrolled at the school at the time of the study (Table 1).

Perceived social support, self-efficacy, stigma, and SRH services utilization

Of the total number of respondents, 198 (16.9%) (95% CI 14.8%-19.2%) used at least one SRH service in the last 12 months. The participants' mean (±SD) stigma score was (12.47 ± 5.21). The PSS score was (57.02 ± 12.68), and the self-efficacy score was (27.91 ± 7.50). The result of the internal consistency test using Cronbach's alpha shows that PSS, self-efficacy, and stigma were 0.911, 0.884, and 0.886, respectively. The finding indicates a high level of reliability for each of these scales (Table 2).

Table 2: Descriptive analysis of Stigma, Self-efficacy, and Perceived social support scores of adolescents in Gamo Zone, South Ethiopia Regional State, 2023.

Scales and dimension	Number of items	Minimum	Maximum	Mean ± SD	Internal consistency test
Self-efficacy social support	10	10	40	27.91±7.50	0.884
Perceived	12	19	84	57.02±12.68	0.911
Stigma	20	0	20	12.47±5.21	0.886

Table 1: Socio-demographic characteristics of adolescents in Gamo Zone, South Ethiopia Regional State, 2023.

Variables	Category	Frequency	Percentage
Age (in years)	Early adolescents (10–14 years)	497	42.4
	Late adolescents (15–19 years)	675	57.6
Sex of respondent	Male	512	43.7
	Female	660	56.3
Residence	Urban	689	58.8
	Rural	483	41.2
School enrolment status	School enrolled	1022	87.2
	Not enrolled in school	150	12.8
Attendance at religious services	Every day	170	14.5
	At least once a week	905	77.2
	At least once a month	82	7.0
	Never	15	1.3
Living arrangement	Lived with their parents	999	85.2
	Not living with their parents	173	14.8

Correlations between perceived social support, self-efficacy, stigma, and SRH Services Utilization

The result of correction analysis shows that there is a negative correlation between SRH-related stigma with SRH services utilization (r=-0.2042, p<0.001), PSS (r = -0.120, p<0.001) and self-efficacy (r = -0.0739, p<0.001). Perceived social support shows positive correlation with SRH service utilization (r=0.2146, p<0.001) and with self-efficacy (r=0.1762, p<0.001). Self-efficacy also shows a positive correlation with the utilization of SRH services (r=0.2450, p<0.001) (Table 3).

Table 3: The correlation between Stigma, Self-efficacy, and Social support of adolescents in Gamo Zone, South Ethiopia Regional State, 2023.

		Pearson correlation coefficient			
		Stigma	Perceived social support	Self-efficacy	SRH services utilization
1	Stigma				
2	Perceived social support	-0.120**			
3	Self-efficacy	-0.0739**	0.1762**		
4	SRH services utilization	-0.2042**	0.2146**	0.2450 **	-

**p < 0.001

A single Mediating effect of Self-efficacy and Social support

A single mediation analysis result using self-efficacy as a mediator shows that higher self-efficacy predicted better use of SRH services (=0.0116, p<0.001). The mediating effect value was -0.00123 [bootstrap 95% CI:-0.0023, -0.0002)]. The indirect effect of SRH-related stigma on SRH services utilization through self-efficacy accounted for 8.16% of the total effect. Likewise, result of PSS as a mediator shows that higher PSS predicts better use of SRH services (=0.0057, p<0.001). The mediating effect value was -0.0017 [Bootstrap 95% CI: -0.0026, -0.0007]. The indirect effect of SRH-related stigma on the use of SRH services via PSS accounts for 11.56% of the total effect. The finding indicated that self-efficacy as well as PSS had a partial mediating role in the relationship between SRH-related stigma and utilization of SRH service. These results supported our Hypothesis 1 and 2 (Table 4 and Figure 1&2).

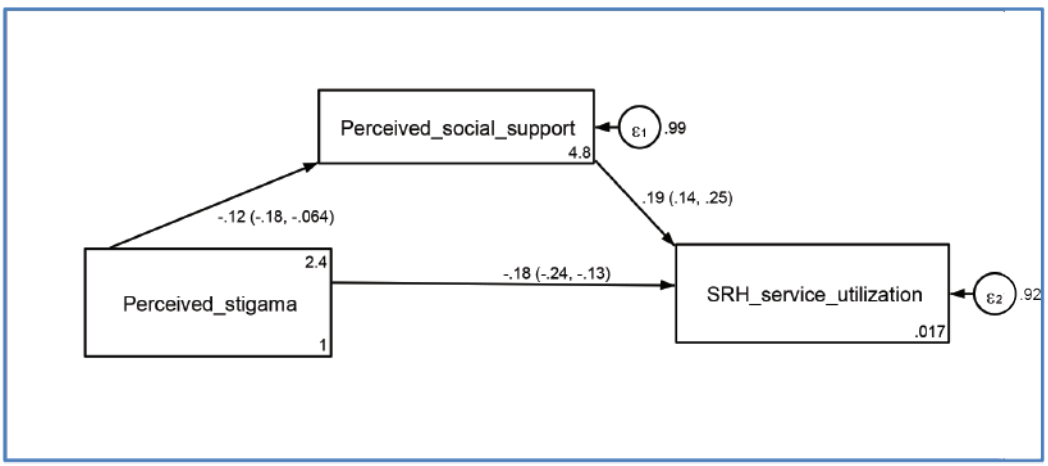

Figure 1: The single mediation role of social support in the relationship between stigma and SRH services utilization in Gamo Zone, South Ethiopia Regional State, 2023.

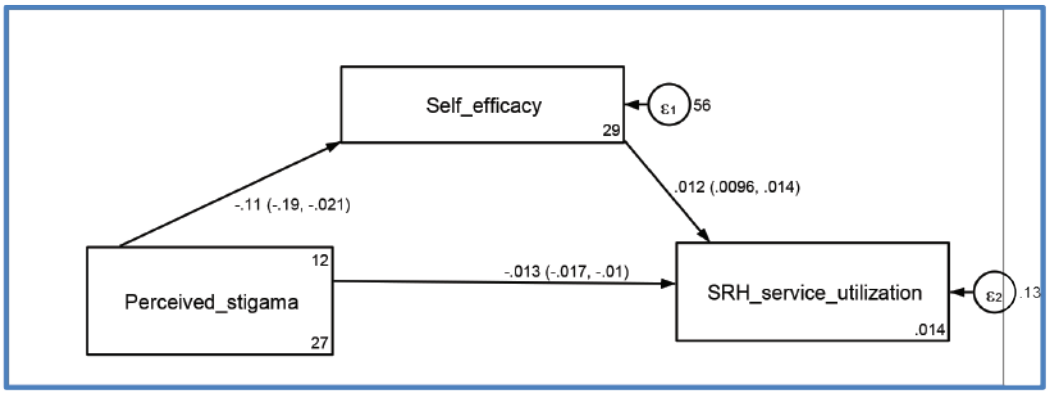

Figure 2: The single mediation role of self-efficacy in the relationship between stigma and SRH services utilization among adolescents in Gamo Zone, South Ethiopia Regional State, 2023.

The chain mediating effect of social support and self-efficacy

The results of the chain mediation analyses showed that the direct effect was -0.0122 [bootstrap 95% CI: (-0.0157,-0.0088)]. The chain mediation model revealed that PSS and self-efficacy sequentially mediated the effect of SRH-related stigma on SRH service utilization, with a mediation effect value of -0.0025[bootstrap 95% CI: (-0.0034,-0.0015)]. The chain mediation effect consisted of indirect effects generated by the three paths. **Path 1** (stigma→ PSS → SRH service utilization). **Path 2** (stigma→ self-efficacy → SRH service utilization), and **Path 3** (stigma→ PSS → Self-efficacy → SRH service utilization). The indirect effect of SRH-related stigma on SRH service utilization via the three paths accounted for 17.01%. These results support hypothesis 3 (Table 4 and Figure 3).

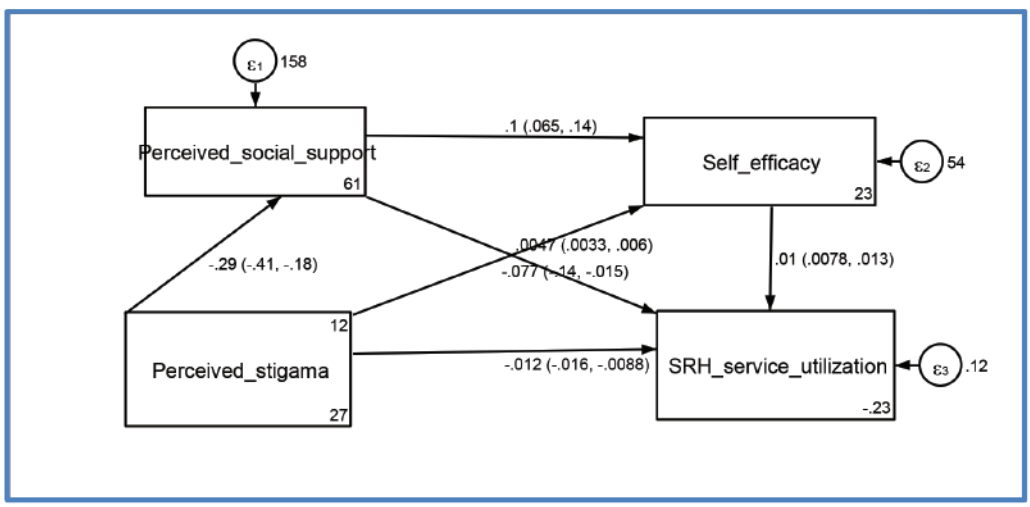

Figure 3: The chain mediation role of social Ssupport and self-efficacy in the relationship between perceived stigma and SRH services utilization in Gamo Zone, South Ethiopia Regional State, 2023.

Table 4: Single and chain mediation role of social support and self-efficacy in the relationship between perceived stigma and SRH services Utilization in Gamo Zone, South Ethiopia Regional State, 2023.

Mediating Variables	Effect	Estimates (β ¬)	Bootstrap Std. Err.	upper	Boot CI lower	P-value	Relative Effect Value
Perceived social support	Direct effect	-0.0130	0.0024	-0.0179	-0.0082	0.0001	88.44%
	Indirect effect	-0.0017	0.0004	-0.0026	-0.0007	0.001	11.56%
	Total effect	-0.0147	0.0025	-0.0019	-0.0098	0.001	
Self-efficacy	Direct effect	-0.0135	0.0017	-0.0168	-0.0100	0.0001	91.84%
	Indirect effect	-0.0012	0.0005	-0.0022	-0.0002	0.022	8.16%
	Total effect	-0.0147	0.0019	-0.0186	-0.0107	0.0001	
Chain mediation role	Direct effect	-0.0122	0.0018	-0.0157	-0.0088	0.0001	82.99%
	Indirect effect	-0.0025	-0.0005	-0.0034	0.0015	0.0001	17.01%
	Total effect	-0.0147	0.0018	-0.0181	-0.0112	0.0001	

DISCUSSION

This study aimed to examine the chain and single mediation roles of self-efficacy and PSS in the association between the utilization of SRH services and SRH-related stigma among adolescents in South Ethiopia. The results revealed that SRH-related stigma was negatively correlated with PSS, SRH service utilization and self-efficacy. The association between SRH-related stigma and SRH service utilization was partially mediated by self-efficacy and perceived social support. The chain mediation model revealed that PSS and self-efficacy sequentially mediate the effect of SRH-related stigma on SRH service utilization.

The stigma associated with SRH is negatively correlated with SRH service utilization, PSS, and self-efficacy. These findings are consistent with those from other studies documenting the role of SRH-related and other types of stigma[16, 27, 28]. These findings highlight the need to design strategies to improve adolescents' use of SRH services. Additionally, exploring alternative strategies for managing and mitigating the consequences of SRH-related stigma may be a promising approach.

The findings of this study showed that the association between SRH-related stigma and SRH service utilization was partially mediated by perceived social support. The results of previous studies support this finding[18, 21, 28]. These findings highlight the need to design interventions to create a supportive environment focusing on PSS for adolescents to increase their resilience to stigma and the use of SRH services.

The association between SRH-related stigma and SRH service utilization was partially mediated by self-efficacy, consistent with previous studies showing that individuals with higher self-efficacies are less vulnerable to stigma and are better able to get things done[29, 30]. The finding implies the need to build adolescent self-efficacy.

Furthermore, the chain mediation analysis showed that PSS and self-efficacy sequentially mediated the effect of SRH-related stigma on SRH service utilization. A previous study also reported that PSS and self-efficacy are sequential mediates of the association between HIV-related stigma and HIV self-management[21]. Likewise, previous evidence suggests that focusing on enhancing self-efficacy and social support can have a positive impact on adolescent behavior[18, 23]. This might be because people with less perceived stigma initially perceive more social support and then increase their self-efficacy, thus encouraging the use of their SRH services.

CONCLUSION AND IMPLICATION OF STUDY

The current study findings revealed that SRH-related stigma was negatively correlated with PSS, SRH service utilization, and self-efficacy. The association between SRH-related stigma and SRH service utilization was partially mediated by PSS and self-efficacy. Furthermore, the chain mediation model revealed that PSS and self-efficacy sequentially mediated the effect of SRH-related stigma on SRH service utilization. The finding implies that stigma related to SRH poses a major threat to utilized services in the study area. Urgent intervention targeting on "3S" stigma, social support, and self-efficacy is needed to improve adolescent SRH service utilization in Ethiopia.

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THE EFFECTIVE EVALUATION OF DIGITAL REPRODUCTIVE HEALTH LITERACY INTERVENTION ON SERVICE COMPETENCIES OF HEALTH PROVIDERS IN ADOLESCENT AND YOUTH HEALTH CLINICS IN THAILAND

Kirana Dheva-aksorn[1], Ungsinun Intrakamhang[2], Pitchada Prasittichok [3]

ABSTRACT

INTRODUCTION: Globally, reproductive health remains concerning due to the insufficient knowledge and understanding among healthcare providers. This knowledge gap also extends to their limited ability to utilize technology for delivering services. The purpose of this research was to find the effectiveness of the Digital Reproductive Health Literacy (DRHL) intervention to enhance service competencies.

METHODS: The randomized controlled trials (RCTs) were conducted from January to July 2023. The 60 participants aged 20 to 60 working in adolescent and youth clinics were selected through random assignment and 30 were allocated to 12 hours of intervention in 6 modules, consisting of knowledge, digital skills, communication skills, provider attitudes, digital-based services, and networking skills. 30 participants were assigned in the control group. The data were collected using the DRHL scale with a reliability of 0.97, and a discriminant power of 0.2 to 0.8. Data were analyzed using MANCOVA.

RESULTS: The results showed that health providers in the experimental group had a significantly higher mean score of DRHL (Mean = 90.83, 80.60) and competencies (Mean 69.60, 62.00) than the control group at after treatment and follow-up (Mean = 93.13, 81.13; Mean= 70.57, 62.97, $p<.01$). The mean score of the experimental group with DRHL and competencies by domains at follow-up were higher than the mean score before treatment ($p < .05$). The DRHL intervention effectively enhance the competencies of health providers.

CONCLUSION: Human resources specialists or administrators could apply DRHL intervention to promote DRHL and competencies for health providers working in adolescent and youth health clinics.

KEYWORDS: reproductive health, health literacy, digital literacy, adolescent and youth, competency

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INTRODUCTION

Reproductive health has emerged as a global concern since 1994, with maternal deaths primarily linked to pregnancy and delivery, particularly in middle- to low-income countries[1]. Adolescent girls aged 10 to 14 face a higher risk of complications and death during pregnancy[2]. Equipping adolescents with reproductive health knowledge before conception, during pregnancy, and post-childbirth is crucial in preventing unplanned pregnancies, unsafe abortions, and related consequences, ultimately saving lives[3]. The World Health Organization (WHO) has established a benchmark for total fertility rates (TFR) at 2.1 for individuals. A TFR below this threshold can impact the labor force and contribute to an aging society, thereby affecting a nation's economy and social fabric[4,5]. WHO's research reveals a significant proportion of maternal deaths worldwide are linked to pregnancy and childbirth, with a staggering 94% occurring in low- and middle-income countries. Notably, adolescent girls aged 10-14 face a higher risk of pregnancy-related complications and fatalities. This is partly attributed to inadequate reproductive health knowledge, a lack of skills, limited access to online health information, and insufficient planning abilities among health providers[6-8]. Moreover, there is a deficiency in interpersonal communication, capacity for problem-solving, and effective use of technology as a tool in their work[6,9]. Addressing these challenges necessitates the establishment of adolescent and youth health clinics staffed by knowledgeable professionals proficient in digital reproductive health. This approach promises more convenient, efficient, and cost-effective healthcare services, enhancing accessibility without discrimination. Recognizing the critical role of personnel in reproductive health, WHO emphasizes continuous development, ensuring that health providers possess the requisite knowledge and skills to offer advice[10], thereby promoting equitable access to rights and treatments[11]. This investment in human capital is a cornerstone of a robust healthcare system, tailor-made to address the prevailing circumstances[12,13]. Furthermore, WHO advocates for the integration of digital health solutions among healthcare providers and their clientele as a secure and cost-efficient strategy for the future[14]. This approach promises enhanced satisfaction and outcomes for the target audience, setting new standards for healthcare provision[15]. In summarizing previous research, it is evident that there is a substantial deficit in reproductive health education among health providers in adolescent and youth health clinics, with knowledge gaps often extending beyond digital channels. The researcher has developed a digital intervention that combines various methodologies from related works of literature to promote Digital Reproductive Health Literacy (DRHL) among health providers in adolescent and youth health clinics. This intervention equips providers with the skills to access, understand, assess, and apply information related to reproductive health. Consequently, it enhances their knowledge, skills, and attitudes, leading to improved competencies in their work.

OBJECTIVE

The aim of this research is to find the effectiveness of Digital Reproductive Health Literacy (DRHL) intervention to enhance service competencies among health providers that can foster greater satisfaction among service recipients, thereby increasing the number of teenagers and young people seeking quality reproductive health services through digital channels.

METHODS

Research Design

The randomized controlled trials (RCTs) with pretest, posttest, and follow-up that was conducted from January to July 2023. The research question was "Does the DRHL intervention effectively enhance the competencies of health providers in adolescent and youth health clinics?" Three research hypotheses are H1: the health providers in the experimental group have significantly higher

scores in digital reproductive health knowledge and competencies in the post-experiment compared to the control group, H2: the health providers in the experimental group have significantly greater scores in digital reproductive health knowledge and competencies in the follow-up period compared to the control group, and H3: the health providers in the experimental group have significantly higher scores in digital reproductive health knowledge and competencies in the follow-up period compared to the before treatment.

Participants

The research used an assignment random sampling design for an experimental design, specifically targeting 60 health providers from population of 899 accredited service centers under the Ministry of Public Health across Thailand. These individuals possessed a minimum of one year of experience working in adolescent and youth clinics and had not received previous training in DRHL. The DRHL intervention was certified for human research ethics from Srinakharinwirot University. Project No. SLUEC-G- 015/2023. Certification Date 3rd February 2023.

Evaluation Design

The aim of this research was to find the effectiveness of Digital Reproductive Health Literacy (DRHL) and intervention to enhance service competencies among health providers . An integrated research methodology was employed, featuring an experimental model, pre-post intervention, and follow-up. This methodological approach was devised in accordance with Creswell's framework[17]. A questionnaire of DRHL was integrated with concepts from the Self-Efficacy Theory[18], Experiential Learning Theory[19], and Human Resource Development concept. A questionnaire of competencies in this research was employed by the Youth Friendly Health Services standards and Cooper's 19 operational competency concept. The content of each activity was derived from Sørensen's conceptualization of health literacy, encompassing four key components: access, understand, appraise, and apply health information20.

Data Collection

The gathered data from related works of literature was utilized to design the DRHL intervention for health providers in the clinics. Assessments included a DRHL assessment consisting of 20 questions for health providers in adolescent and youth clinics with a reliability of 0.93 and a competency assessment questionnaire comprising 15 questions for working with adolescents in these clinics with a reliability of 0.94, respectively, which were considered by five experts with an IOC value range from 0.26 to 0.97.21 The appropriateness of the intervention was evaluated by five experts in reproductive health, health promotion, and behavioral science, utilizing an intervention conformity assessment form. The study employed an experimental design with samples consisting of medical and public health personnel providing services in hospitals or health clinics. The sample was selected through random assignment sampling, resulting in 30 participants in the experimental group and 30 in the control group. The sample size was determined based on the principle of Cohen 19 and G*Power. 19 with a power value of 0.85, an error of .05, and a medium effect size of 0.25. The researcher added 10% to the sample in case of resignation by the participants; therefore, 60 cases were yielded. The study evaluated the results before and after the experiment, as well as one-month follow-up, comparing the experimental and control groups.

Measurement

The intervention was designed and developed to encompass1 education,2 practical operational skills, and3 fostering a positive service provider attitude to facilitate widespread participation., A 12-hour online training intervention was organized in March, taking advantage of a two-day public holiday. Additionally, the intervention 's content and activities including 6 modules of total 720 minutes or 12 hours were delineated. as the detail follows in Table 1

Table 1. DRHL Intervention on Competencies Enhancement of Health providers.

Module	Time	Activities
Module 1: Related Knowledge	90 minutes	The lecture covers topics related to digital reproductive health and standardized service delivery for adolescents. The session includes activities such as watching short video clips, engaging in discussions, and expressing opinions. Participants also have the opportunity to make observations and reflect on the content they've learned. Additionally, the session concludes with the acknowledgment of achievements, including rewarding compliments and other recognitions.opportunity to make observations and reflect on the content they've learned. Additionally, the session concludes with the acknowledgment of achievements, including rewarding compliments and other recognitions.
Module 2: Digital Adaptation Skills	90 minutes	Engaging in a knowledge-sharing session where we explore challenges and the significance of adapting to adolescents in the digital age. This involves critical questioning, open discussions of opinions, and the recognition of valuable contributions, including rewarding compliments and other forms of acknowledgment.
Module 3: communica-tion skills	90 minutes	Training in creative communication skills, which includes fostering critical questioning, facilitating open discussions of opinions, and acknowledging achievements through rewarding compliments and other forms of recognition.
Module 4: Provider attitude and awareness	90 minutes	Engaging in an attitude exchange among health providers, which involves critical questioning, open discussions of opinions, and interactive role-playing exercises. The session also includes the recognition of valuable contributions, including rewarding compliments and other forms of acknowledgment.
Module 5: Digital based services	180 minutes	Training in creative communication skills, which encompasses critical questioning, open discussions of opinions, interactive role-playing, and the acknowledgment of achievements through rewarding compliments and other forms of recognition.
Module 6: Networking skills	180 minutes	Training to enhance service competency through the development of critical questioning skills, open discussions of opinions, interactive role-play activities, and the recognition of achievements through rewarding compliments and other incentives.

Data Analysis

The selection of subjects in this study was independent, and the normality assumption of the data was assessed by examining skewness and kurtosis using the Shapiro-Wilk test and parametric statistics. The results indicated a significant difference in mean scores between the experimental and control groups for DRHL and competencies with p-value < 0.05 and < .01, using MANCOVA revealed a statistically significant increase in the total score of DRHL and competencies for the experimental group after the treatment.

RESULTS

Absolute Variation

The population had a minimum of one year of experience working in adolescent and youth clinics and had not received previous training in DRHL. The result of the data analysis revealed that the DRHL mean scores of the health providers in the experimental and control groups were before treatment of 71.83 and 80.60, after of 90.83 and 80.73, and follow-up (1 month) of 93.13 and 81.13. The competencies mean scores were before treatment of 54.03 and 60.90, after of 69.60 and 62.00, and follow-up (1 month) of 70.57 and 62.97 respectively as followed in Table 2.

Table 2. Mean and standard deviation of DRHL and Competencies classified by experimental group and control group.

DRHL, Competencies and Components	Experimental group		Control group		Total	
	M	SD	M	SD	M	SD
DRHL						
Before treatment	71.83	10.08	80.60	8.22	76.22	10.13
After treatment	90.83	6.77	80.73	8.18	85.78	9.02
Follow-up	93.13	3.63	81.13	4.66	87.13	7.33
Access						
Before treatment	21.43	3.34	24.20	2.63	22.82	3.23
After treatment	27.40	2.33	24.57	3.03	25.98	3.03
Follow-up	28.03	1.35	24.20	1.90	26.12	2.53
Understand						
Before treatment	18.63	2.86	20.10	2.40	19.37	2.72
After treatment	22.43	2.03	19.57	2.33	21.00	2.60
Follow-up	23.27	1.08	20.20	1.86	21.73	2.16
Appraise						
Before treatment	21.07	3.29	24.00	2.74	22.53	3.35
After treatment	27.47	2.30	24.43	2.80	25.95	2.97
Follow-up	27.73	1.53	24.33	2.26	26.03	2.57
Apply						
Before treatment	10.70	1.62	12.30	1.18	11.50	1.62
After treatment	13.53	1.31	12.17	1.34	12.85	1.48
Follow-up	14.10	0.92	12.40	1.40	13.25	1.46
COMPETENCIES						
Before treatment	54.03	8.65	60.90	8.64	57.47	9.25
After treatment	69.60	5.30	62.00	8.52	65.80	8.01
Follow-up	70.57	3.20	62.97	3.76	66.77	5.16
Knowledge						
Before treatment	20.57	3.36	23.27	3.11	21.92	3.49
After treatment	27.60	2.42	24.43	3.43	26.02	3.35
Follow-up	28.00	1.74	24.80	1.88	26.40	2.42
Skill						
Before treatment	17.80	3.77	20.47	3.25	19.13	3.72
After treatment	22.97	2.09	20.50	2.95	21.73	2.82
Follow-up	23.50	1.41	20.97	1.81	22.23	2.05
Attitude						
Before treatment	15.67	2.77	17.17	2.83	16.42	2.88
After treatment	19.03	1.27	17.07	2.75	18.05	2.35
Follow-up	19.07	0.87	17.20	1.54	18.13	1.56

Table 2 shows that DRHL and competencies scores before treatment of the experimental and control groups were different. These results indicate that before treatment, the health providers in the experimental group had a lower score than those in the control group. However, after treatment and follow-up shows that DRHL and competencies scores of health providers in experimental group were higher than in control groups. The result of preliminary assumption found that all variables were normally distributed. In addition, testing the influence of variables that may affect the experimental variables was eliminated by comparison scores in before treatment as following in Table 3.

Table 3 Multivariate analysis of DRHL and competencies scores in the before treatment.

Source of variation	Wilk's lambda	Hypothesisdf	Errordf	MultivariateF test	p-value
Group	.639	7	52	4.20	.001

Table 3 showed that the before treatment, the health providers in the experimental group had significantly lower scores of DRHL and competencies than compared to the control group. Therefore, MANCOVA was used in hypothesis testing. The scores in the before treatment period was covariance.

Results of Hypotheses Testing

The testing of Hypothesis 1: In the post-experiment, the health providers in the experimental group had significantly higher scores of DRHL and competencies than compared to the control group as following in Table 4.

Table 4. MANCOVA Analysis, Testing the Differences Between Groups After Treatment

Source of variation		SS	MS	F	p-value
DRHL					
- Access	Group	87.66	87.66	14.94**	.001
	Error	299.27	5.87		
- Understand	Group	67.92	67.92	14.78**	.001
	Error	234.32	4.60		
- Appraise	Group	114.20	114.20	18.91**	.001
	Error	308.03	6.04		
- Apply	Group	17.47	17.47	9.55**	.003
	Error	93.31	1.83		
Competencies					
- Knowledge					
	Group	72.42	72.42	9.77**	.003
	Error	378.01	7.41		
- Attitude	Group	54.51	54.51	9.79**	.003
	Error	284.02	5.57		
- Skill	Group	57.75	57.75	15.53**	.001
	Error	189.65	3.72		

*p<.05, ** p<.01

Table 4 MACOVA analysis in after treatment period, the results of test of between-subjects effects showed that the DRHL and competencies of the experimental group significantly differed from the control group across all four domains at the .05 level.

The testing of Hypothesis 2: The health providers in the experimental group had significantly higher scores of digital reproductive health knowledge and competencies in the follow-up period compared to the control group as following in Table 5.

Table 5. MANCOVA Analysis, Testing the Differences Between Groups at Follow-Up.

Source of variation		SS	MS	F	p-value
DRHL					
- Access	Group	135.89	135.89	47.49**	.001
	Error	145.92	2.86		
- Understand	Group	86.60	86.60	35.12**	.001
	Error	128.66	2.52		
- Appraise	Group	117.75	117.75	32.24**	.001
	Error	186.25	3.65		
- Apply	Group	19.53	19.53	13.34**	.001
	Error	74.66	1.46		
Competencies					
- Knowledge					
	Group	59.36	59.36	20.53**	.001
	Error	147.47	2.89		
- Attitude	Group	55.813	55.81	20.53**	.001
	Error	138.68	2.72		
- Skill	Group	18.44	18.44	11.53**	.001
	Error	81.60	1.60		

*p<.05, ** p<.01

Table 5 MACOVA analysis in follow-up period, the results of test of between-subjects effects showed that the DRHL and competencies of the experimental group significantly differed from the control group across all four domains at the .05 level.

The testing of Hypothesis 3: The health providers in the experimental group had significantly higher scores of DRHL and competencies in the follow-up period compared to the before treatment as following in Table 6.

Table 6. Comparison of mean scores by domains between before treatment and the follow-up period in the experimental group.

Components	Period	M	SD	Mean Different (d)	SE	p-value
DRHL						
- Access	Before	21.43	3.34	6.60	0.64	.001
	Follow-up	28.03	1.35			
-Understand	Before	18.63	2.86	4.64	0.59	.001
	Follow-up	23.27	1.08			
- Appraise	Before	21.07	3.29	6.66	0.70	.001
	Follow-up	27.73	1.53			
- Apply	Before	10.70	1.62	3.40	0.37	.001
	Follow-up	14.10	0.92			
Competencies						
-Knowledge						
	Before	20.57	3.36	7.43	0.68	.001
	Follow-up	28.00	1.74			
-Attitude	Before	17.80	3.77	5.70	0.76	.001
	Follow-up	23.50	1.41			
-Skill	Before	15.67	2.77	3.40	0.50	.001
	Follow-up	19.07	0.87			

Table 6: In comparison the mean scores of DRHL and competencies in follow-up period had significantly the highest scores in the before treatment period in experimental group (p<.001)

DISCUSSION

After treatment and follow-up shows that DRHL and competencies scores of health providers in experimental group were higher than in control groups. The before treatment, the health providers in the experimental group had significantly lower scores of DRHL and competencies than compared to the control group. The post-experiment, the health providers in the experimental group had significantly higher scores of DRHL and competencies than compared to the control group. The health providers in the experimental group had significantly higher scores of digital reproductive health knowledge and competencies in the follow-up period compared to the control group. In comparison the mean scores of DRHL and competencies in the follow-up period had significantly the highest scores in the before treatment period in experimental group. In enhancing DRHL according to the H1, H2, and H3, the findings can be analyzed regarding experimental group who has a strong knowledge of DRHL and competencies in the post-experimental and follow-up period. For the reason that many health clinics have used technology to improve services to be convenient and faster for the competencies of personnel, it consists of three components according to competency assessment concept of Carlton Cooper 19;[1] knowledge of service personnel,[2] attitudes of service personnel, and[3] skills of service personnel. This signifies that enhancing job-related knowledge exerts the most significant influence in comparison to other competencies components when it comes to boosting work efficiency. Consequently, it becomes imperative to prioritize the augmentation of work-related knowledge, alongside the incorporation of additional elements of operational competency among service personnel. Knowledge entails the possession of information, facts, or insights acquired through study, observations, and experiences. This encompasses a range of attributes, such as individual traits, factual knowledge, and expertise. When this knowledge is combined with

the ability to access information, comprehend data, and apply digital reproductive health information effectively, it results in the highest knowledge score. Following knowledge, practical training, or skill development for participation in the intervention holds the next highest position in terms of its impact on competencies. Attitude toward service, which involves expressing one's perspective and its manifestation in behavior, including emotions, beliefs, and actions, also plays a crucial role.

This DRHL intervention focused on the practical applications of reproductive health information through digital platforms and online networking skills. Therefore, health providers have the service skills to promote health literacy for adolescents at risk for sexual and reproductive health (SRH) issues, so that they have help-seeking from correct government service and information sources through online to take care of their own health. efore coming to receive services in Adolescent and Youths' Clinics. An umbrella review study of Huang et al22. in seventeen review articles supported that digital health literacy intervention related SRH for adolescent development and health promotion had effectively utlized web-based health information and health media design for adolescent use. Additionally, several digital health strategies have also been identified that can be used to further develop integrated SRH-informed services to improve adolescent health outcomes. Health providers generated several strategies to guide future digital based SRH promotion. For the primary prevention focused DRHL interventions, greater emphasis is on using technology to promote knowledge, healthy SRH behaviors (e.g. behaviors for preventing pregnancy or sexually transmitted disease), and screening and follow-up through public health campaigns23. Some interventions also provide online counseling or referral support to link users to essential SRH services when needed (e.g., medically assisted abortion, family planning, STI, HIV care)[23]. In accordance with the policy of WHO, newcomers to digital health can use it as a start-to-finish primer on how to collaboratively and responsibly develop youth-centered digital health interventions. WHO guidelines provided recommendations on digital health interventions for health system strengthening. It included recommendations on using targeted client communication (TCC) to transmit health information, including health education, to specific audiences based on health status or demographic profile[24]. Such information might be for health promotion, spreading awareness of services and behaviors, reminding people about services or adherence to treatments, or notifying people about diagnostic results. Information might be transmitted via text message, voice, interactive voice response, applications or social media[25].

CONCLUSION

The DRHL intervention effectively showcased a statistically significant enhancement in the DRHL and operational competency of healthcare providers working in adolescent and youth health clinics. This achievement was made possible through the successful integration of theoretical concepts with practical techniques and methodologies. However, it is vital to acknowledge that the promotion of reproductive health among adolescents and young individuals is not the sole responsibility of health providers in these clinics. Parents, guardians, community volunteers, religious leaders, and teachers also wield significant influence in educating and supporting young individuals. Therefore, it is advisable that relevant agencies extend the implementation of the DRHL intervention to encompass broader contexts. This expansion should aim to enhance the competencies of health providers while striving for optimal outcomes in the broader community, considering the pivotal roles played by various stakeholders in promoting reproductive health among adolescents and young people.

DECLARATIONS

Limitations

The study targeted medical and public health personnel working in government facilities nationwide, a population known for their heavy workload and duty on holidays. Despite organizing the intervention during public holidays and online, limited participation in the training was observed. Given the inability to employ proportional random sampling across different regions, the study employed the Assignment Random Sampling method to divide participants into the experimental and control groups. As the DRHL intervention was conducted through online meetings, there is a potential limitation regarding participants' access to communication devices or internet signal, which could hinder their active participation in the sessions.

Availability of data and materials

The datasets used for this research are all included within the main text.

Abbreviations

DRHL - Digital Reproductive Health Literacy

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Authors' Contributions KD: Conceptual research, designed the research, supervised, designed questionnaire, analyzed the data, drafted and reviewed the manuscript UI: supervised, designed the research, designed questionnaire, reviewed the manuscript. PP: Designed the research, designed questionnaire, analyzed data.

Declaration of Conflicting Interests

The authors have declared that no interest exists.

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UTERINE TORSION WITH PLACENTAL ABRUPTION AND FETAL DEATH AT TERM PREGNANCY: A CASE REPORT AND LITERATURE REVIEW

Melat Sebsibie, MD, MPH[1]

ABSTRACT

BACKGROUND: Uterine torsion in pregnancy is a rare event that requires urgent recognition and management. Its presentation is non-specific and ranges from asymptomatic to severe life-threatening conditions such as placental abruption with hemorrhagic shock and maternal and fetal death. Here we describe our case and reviewed similar literature on gravid uterine torsion. To our knowledge, this is the first report of term uterine torsion complicated by placental abruption and fetal death in Africa.

CASE PRESENTATION: A 28 year old Ethiopian gravida III, para II woman, presented at 37 weeks of gestation with acute severe abdominal pain, mild vaginal bleeding, absent fetal movement, and shock. Emergency cesarean section was decided with a presumptive diagnosis of placental abruption with hemorrhagic shock and intrauterine fetal demise. Intraoperatively, it was realized that the placenta and the dead fetus were delivered through an inadvertent posterior lower segment hysterotomy made on 1800 levo-rotated uterine torsion. Then the uterus was restored to its anatomic position and the posterior hysterotomy was closed. Despite medical measures, the uterus became atonic and a hysterectomy was required. The patient had an uneventful postoperative and postpartum course.

CONCLUSION: Even if gravid uterine torsion is uncommon, it should be kept in mind as one of the differentials in pregnancy-related acute abdominal emergencies due to its non-specific nature and dangerous impact. Furthermore, it can be obscured and associated with other obstetric emergencies, especially placental abruption.

KEYWORDS: uterine torsion, placental abruption, pregnancy, Ethiopia, case report

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INTRODUCTION

Axial rotation of the uterus more than 45° is pathologic and is known as uterine torsion.1-3 It is a rare entity with an unknown incidence observed in both gravid and non-gravid uterus. It also affects all ages and all parity groups. Uterine torsion for the first time was reported in 1863 by Virchow in a deceased woman. Later Labbe reported it in living women in 1876.[1,2,4,5]

Even if the exact etiology is unknown, conditions affecting the anatomic fixity of the uterus are incriminated in the process. These conditions include myoma, uterine anomalies, adnexal masses, fetal malpresentation, pelvic abnormalities, trauma, and connective tissue disorders.[1,2,3,5,6]

Physiologically, in two third of the cases, the gravid uterus is dextro-rotated less than 45°.1-3 The torsion occurs at the level of uterine isthmus and is commonly 1800; however, more severe cases of up to 7200 are reported.2,7 All trimesters of pregnancy are at risk but 67 to 78% of torsions occur in the third trimester of pregnancy.[2,5] The earliest reported gestational age for uterine torsion during pregnancy is in the 6th week and the latest is in the 43rd week.[2]

In most cases, the diagnosis of gravid uterine torsion is made intraoperatively. This is because the symptoms are either absent or non-specific.[2,4,5,8] Furthermore, it may also be obscured by associated obstetric emergency conditions, especially placental abruption. In general, the symptoms may range from mild abdominal pain to life-threatening conditions such as hemorrhagic shock, and fetal and maternal death.[1-3,5,7,9-18] In suspected cases, imaging such as sonography and MRI may help in the diagnosis.[5,19,20]

Uterine torsion is an obstetric emergency that requires laparotomy to correct the torsion and further procedures may be performed based on the gestational age and associated conditions.[2,3,5] If not treated timely, it is associated with grave outcomes and may result in maternal and perinatal mortality.[2,5,7,8,11,12.21]

In this paper, we report a case of third-trimester (37 weeks) uterine torsion identified intra operatively and complicated by placental abruption and intrauterine fetal death (IUFD). The challenges and difficulties in making the diagnosis are discussed. Moreover, we reviewed similar literature on uterine torsion since 1999. To the best of our knowledge, this is the first report of uterine torsion complicated by placental abruption and fetal death in Africa.

CASE PRESENTATION

A 28-years old Ethiopian gravida III, para II woman presented to our hospital at the gestational age (GA) of 37+2 weeks from reliable last menstrual period (LMP) with sudden onset of abdominal pain of one-day duration. The pain was initially located in the lower abdomen and later become diffuse and accompanied by absent fetal movement, mild vaginal bleeding, headache, light headedness and syncopal episode. She had no associated history of trauma or previous surgery and no other significant obstetric danger symptoms. She also denied self or family history of chronic medical illnesses.

Her prior obstetric history revealed two vaginal deliveries at term. One is alive and the other was stillbirth after home delivery by a traditional birth attendant with no identifiable cause.

She had regular antenatal care (ANC) follow-ups starting from16 weeks of GA at the nearby primary healthcare facility and it was uneventful. With the recent complaint, she visited the nearby primary health care and was referred to our hospital.

On arrival to our hospital, she was pale, hypotensive (undetectable blood pressure) and faint pulse. Abdominal examination revealed diffuse tenderness, a large for date tense gravid uterus with a longitudinal fetal lie and breech presentation. There was no uterine contraction and the fetal heart beat (FHB) was negative. On digital pelvic examination, cervix admitted the tip of a finger, uneffaced and posterior, station -1, medium consistency, and mild vaginal bleeding.

Immediately, a double intravenous (IV) line was secured, the patient was catheterized, shock management was initiated and blood was drawn for cross-match and laboratory workup. Emergency obstetric ultrasound showed 37 weeks single intrauterine pregnancy, breech presentation, negative FHB, adequate amniotic fluid, and 12x13cm retroplacental clot. The blood test revealed 8mg/dl of hemoglobin level, 9700 / µL white blood cell count and 148000/µL platelet count. Renal function (creatinine 0.69) and liver enzyme (ALT 23U/L, AST 16U/L) tests were within the normal limits.

There was a preoperative diagnosis of placental abruption with hemorrhagic shock and intrauterine fetal death (IUFD). Informed consent was taken. Cross-matched blood, fresh frozen plasma (FFP), and platelets were prepared for transfusion. Bed in the intensive care unit (ICU) was secured, prophylactic IV antibiotic was given, and the patient was taken to the operating room for surgical exploration (emergency cesarean section).

Under general anesthesia (GA) abdomen was entered through a midline incision. There was an intact gravid uterus with engorged vessels on the wall and then the lower uterine segment was identified and a transverse incision was made. Upon incision, there was a gush of blood, a freshly dead 2800gm weight male neonate in breech presentation and a completely (100%) detached placenta with a retroplacental clot was found. After delivering the stillbirth baby and the placenta, the uterus was exteriorized. At this point,180-degree levorotation of the uterus at the uterocervical junction was detected (Figure 1 A) and on further inspection, it was realized that the hysterotomy was made on the posterior aspect of the lower uterine segment (Figures 1 A,B, and C). The uterus was restored manually to its anatomic position. It was soft and succulent but no uterine anomalies, myoma or adnexal mass were noted. Then the uterus was mopped and the incision was closed in a double layer. At the same time, uterotonic agents were administered. Despite all these, the uterus continued to be atonic and the patient became hemodynamically unstable due to bleeding for which a hysterectomy was performed. After hemostasis was secured, the abdomen was closed in layers.

Perioperatively, the patient was transfused with six units of blood, platelets, and FFP. She had an uneventful postoperative course and was discharged on the 5th day.

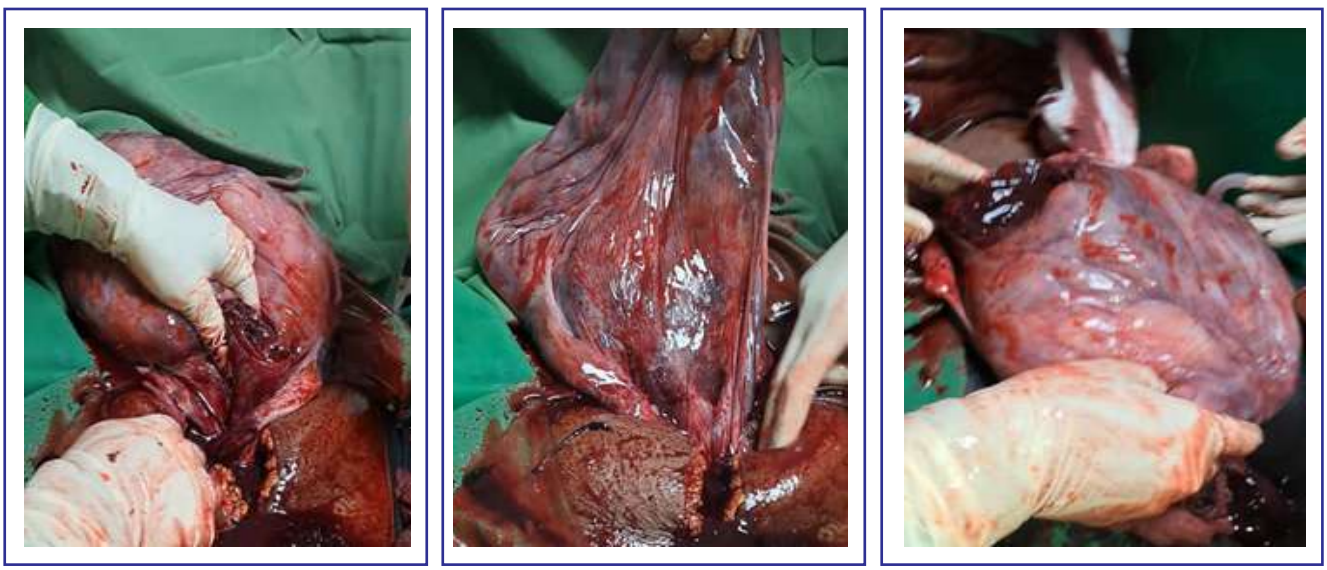

Figure 1: Intraoperative findings after the uterus is exteriorized; (A) 1800 levorotated uterus at the uterocervical junction (white arrow); (B) no incision is noted on the anterior wall of the uterus after detorsion; (A and C) inadvertently made posterior hysterotomy(red arrow).

DISCUSSION

Uterine torsion in association with pregnancy was first described by Labbe in 1876.[1] Subsequently, several authors reported their experience with this rare condition. One of the biggest reviews was made in 1992 by Jansen which included 212 cases of gravid uterine torsion.[2] Recently, in 2020, Ramseyer et al. reviewed 41 cases of gravid uterine torsion since 2006.[5] To the best of our knowledge, this paper is the first case report of term uterine torsion complicated by placental abruption and IUFD in Africa. In 1961 Carter reported a similar case from Harare maternity hospital, however, the neonate died after birth despite resuscitation.[9] Furthermore, we reviewed similar literature on uterine torsion in PubMed/Medline using the terms "uterine torsion" and "placental abruption" and found 10 relevant reports since 1999.[9-18]

Compared with a non-gravid uterus, torsion is commonly reported in the gravid uterus. Pregnancy-associated changes occurring on the uterus might exacerbate its physiologic rotation and increase the risk of this rare phenomenon.[1,2,5,22] As it is noted in our case, most uterine torsions occur in the third trimester. Jensen and Ramseyer et al., in their review, found that 67 % and 78% of cases were in the third trimester, respectively.[2,5] This might be explained by the advancement of pregnancy-induced changes in the third trimester. This includes the growth and softening of the lower uterine segment and congestion and loosening of the tissues.[1,22] Although all parity groups are at risk, uterine torsion is observed mostly in multiparous women.[2,5] Among the 41 cases reported since 2006, more than two third (78%) of the cases occurred in parous women.[5] This could be due to the repeated effect of the pregnancy on uterine fixity.

Nesbitt et al. in 1956 concluded that, "no pelvic pathology, torsion unlikely".1 Unfortunately, several medical literatures revealed patients with no attributable pelvic pathology. Jansen noted 16% and Ramseyer et al. reported 63.4% of the cases with no identifiable pelvic pathology.[2,5] So far, various maternal and fetal contributing factors were reported with gravid uterine torsion (Table 1).[1,2,5,6] Myoma and Müllerian anomalies were the most common pelvic pathologies found in association with uterine torsion.[1,2,23] Some authors also attributed 66% of the cases to intrapelvic conditions.[23] All of these conditions are thought to destabilize the anatomic fixity and predispose to uterine mobility and torsion.[2,5] Duplantier et al. reported the first case of gravid uterine torsion with placental abruption following a road traffic accident and suggested to suspect torsion in a pregnant woman involved in blunt abdominal trauma.10 Others found adhesions following cesarean section as a risk factor and also speculated that it may lead to a weak elongated cervix, especially if it is associated with poor healing at the isthmus.[5,14,24] Uterine torsion can occur iatrogenically following external cephalic version and it is recommended to do ultrasound localization of the placenta prior to and after the procedure for early detection.[25] In our case, the only identified associated factor was the fetal breech presentation. A recent review noted 19.5% of the fetal position are breech.[5] However, the transverse lie is the most common (72%) malpresentation seen in uterine torsion.[2,4] In a woman with multiple predisposing factors, counseling and close follow-up are advised. Authors also advocate limiting or avoiding physical activities in the second and third trimesters of pregnancy.[5,22]

Table 1: Potential Predisposing/triggering factors for gravid uterine torsion

Maternal factors	Uterine developmental malformations such as Müllerian anomalies Pelvic mass- myoma and adnexal mass/cysts Pelvic bone or spine (scoliosis) abnormalities Sudden and abnormal maternal movement Abdominal wall laxity /pendulous abdomen Connective tissue disorders such as Ehlers-Danlos syndrome Malpresentation especially-transverse lie Multiple gestations
Fetal factors	Polyhydramnios Hyperactive fetus Placenta previa Fetal anomalies External cephalic version
Iatrogenic and trauma	Previous abdominal surgery including cesarean section Maternal trauma

Considering the rarity and the non-specific clinical features, gravid uterine torsion is easily misdiagnosed and mostly identified intraoperatively.[1,2,5,7,8,22] Kremer et al. described it as a 'once-in-a-lifetime' diagnosis for obstetricians.[19] Medical literature reported different patterns of presentation namely acute, sub-acute, chronic and intermittent or recurrent based on duration and degree of torsion.[2,6] If symptomatic, its manifestations range from abdominal pain to life-threatening conditions such as placental abruption with hemorrhagic shock and fetal and maternal death.[2,5,9-18] Other non-specific symptoms include nausea, vomiting, diarrhea, urinary symptoms, pallor, abdominal distension and tenderness, rigidity and obstructed labor.[2,5] Of all these, abdominal pain is the most common, seen in as much as 95% of the cases.[1,5] However, several authors reported asymptomatic cases.[26-29] A recent review revealed nearly one-third (31.7%) of patients had no symptoms.[5] Jansen also reported 11% of asymptomatic gravid uterine torsion in his review.[2] Patient's symptoms may be obscured by other causes of acute abdominal emergencies in pregnancy like placental abruption, as happened in our patient and others.9-18 Kopko J et al. described a case of asymptomatic gravid uterine torsion noted accidentally during appendectomy at the 19th week of gestation.[30]

In suspected cases, imaging may assist the preoperative diagnosis. Ultrasound is the first-line imaging for obstetric emergencies and features like a change in placental location, ovarian vessels wrapping around the uterus (on Doppler ultrasound) and abnormal ovary location may suggest gravid uterine torsion. In setups where magnetic resonance imaging (MRI) is available and if the patient is stable, it may demonstrate a "whirlpool sign" at the uterine isthmus due to a change in the upper vagina from its normal H shape to an X shape.[5,19-21] Since our patient had hemodynamic instability and ANC follow-up at another health facility, it was difficult to retrieve and compare the placental location with the previous ultrasound. The emergency ultrasound examination revealed concealed placental abruption that explained all the manifestations and obscured the uterine torsion.

The patient in our report presented acutely with placental abruption, maternal shock and IUFD. Such presentations are uncommon manifestations of this rare pathology and few cases are reported worldwide (Table 2).[3,9-18] Of the 212 cases reviewed by Jansen only 4% had an abruption.[2] Acute torsion compromises uterine blood flow resulting in increased venous pressure which in turn leads to placental abruption and then fetal death.[3,11-13] As it is noted in our patient, mild vaginal bleeding and concealed abruption may indicate the presence of torsion obstructing the outflow.[11] Shock in a gravid uterine torsion is mostly secondary to hemorrhage from the placental abruption, but in late presentation, it may be caused by infection or bleeding from necrosis of the torsioned uterine tissue.[5]

Table 2-Literature review; Characteristics of reported gravid uterine torsion complicated by placental abruption since 1999

Author, Year (reference)	GA	Degree of Torsion	Hypotension	Fetal Position	Time of Diagnosis	Uterine Incision	Fetal Outcome	Maternal Outcome	Risk factor	Hysterectomy
Carter,1961[9+]	38	180, left	Borderline	Vertex	intraoperative	Posterior	Died after birth	Alive	None	Not done
Kovavisarach et al, 1999 [3]	36	180.left	Present	~~	intraoperative	Anterior	IUFD**	Alive	None	Not done
Duplanteir et al,2002[10]	38	180, left	~~~	~~	Intraoperative	Posterior	Alive	Alive	Trauma	Not done
Cook el al, 2004[11]	36	270, right	Present	Vertex	Intraoperative	Not mentioned	IUFD	Alive	None	Done
Munro et al, 2006[12]	32	180, right	Present	Breech	Intraoperative	Posterior	IUFD	Alive	None	Not done
Gohil et al, 2013[13]	28	>180, left	Borderline	Breech	Intraoperative	Not done	IUFD	Alive	None	Done (with the fetus in situ)
Sachan et al,2014[14]	17	380, not described	Present	Transverse	Suspected preoperatively	Anterior	IUFD	Alive	Myoma and previous CS	Uterine artery ligation
Agar et al,2014[15]	36[+5]	180, right	Absent	Transvers	Intraoperative	Posterior	IUFD	Alive	None	Not done
Zullino et al, 2014[16]	33	180, right*	Borderline	Transvers	Intraoperative	Posterior	Died after birth	Alive	None	Not done
Ulu et al, 2016 [17]	32	180, not described	Borderline	Vertex	Intraoperative	Posterior (deliberate)	Alive	Alive	Myoma	Not done
Toshniwal,2018 [19]	20	90, right	Present	~~	Intraoperative	Posterior (deliberate)	IUFD	Alive	Previous CS	Not done
Our case	37	180, left	Present	Breech	Intraoperative	Posterior	IUFD	Alive	None	Done

+included because it is the only report we found from Africa
* interpreted as counterclockwise detorsion
**IUFD; intrauterine fetal death

Irrespective of the gestational age and the presence of symptoms, gravid uterine torsion requires immediate surgical exploration to prevent morbidity and mortality to the mother and the fetus.[5] Literature suggested four pathognomonic intraoperative features of uterine torsion such as uterine artery palpable in the vaginal fornix anteriorly or posteriorly, twisting of the vagina and spiraling of the urethra and /or rectum. Furthermore, abnormal location of the ovary, fallopian tube and round ligament, engorged and tortuous vessels, and overlooking of the bladder reflection may also suggest this condition.[2,5,26,31] In the case discussed here, considering the patient's hemodynamic instability and the rarity of uterine torsion, we rushed to stabilize the patient after identifying the 'lower uterine segment' and failed to detect it before making the uterine incision. Most authors experienced similar challenges intraoperatively especially when complicated by placental abruption and maternal shock (Table 2).[9,10,12,15,16,32-34]

After identifying the torsion, further management depends on the gestational age and status of the uterus (Ischemic or not). Untwisting/derotation should be attempted first, if difficult, as reported by some authors, deliberate incision on the accessible surface (mostly posterior hysterotomy) of the uterus is advised.[2,4,5,17,18,31,35] However, it carries a risk of postoperative adhesion and injury to major vessels, the bladder, and ureters. To avoid injury, it is suggested to make the incision vertical on the fundus or high transverse by observing the bladder plication.[7,9,12,15,28] Others suggested converting

midline incision to facilitate derotation and to prevent the morbidities associated with posterior hysterotomy. However, this was not accepted widely.[5,12] Of the 41 cases reported since 2006, 61 % of them have undergone posterior hysterotomy.[5] In our review of uterine torsion with placental abruption, 7 cases (77.8%) had posterior incisions (Table 2). These patients should be offered elective cesarean deliveries in future pregnancies to avoid labor-induced uterine rupture.[2,4-7,16]

Hysterectomy should be considered in necrotic or ischemic uterus which persisted after detorsion. Furthermore, in situations of severe hemorrhage due to atonicity unresponsive to other means, hysterectomy preserves the patient's life.[5,11] In our case, we performed a hysterectomy for persistent uterine atony causing hemodynamic instability despite medical measures. Gohil et al. described a hysterectomy with the fetus in situ to prevent patient deterioration by avoiding an incision on a hypervascular and congested uterus.13 As reported by authors, patient deterioration may continue due to amniotic fluid embolism following manual derotation of necrotic uterus.[5,11]

If torsion occurs in earlier periods or prior to fetal viability, detorsion and continuation of pregnancy is suggested.[2,5,22,36] Bukar et al. reported successful delivery at term after manual derotation of a 16-week uterine torsion.[36] Moreover, surgical correction of predisposing conditions can be done simultaneously whenever possible.[1,2,5] In general, when managing this rare condition every effort should be made to save the mother's life as stated by Nesbitt and Corner, "undue regard for the fetus should not deter one from instituting prompt and adequate surgical intervention in an attempt to salvage the mother's life."[1]

Unless timely laparotomy is offered, gravid uterine torsion is associated with maternal and fetal mortality. Moreover, the gestational age and degree of torsion influence both maternal and fetal outcomes. Possible causes of maternal death include shock from bleeding, infection, and embolism.[5] So far there is no report of maternal death before 20 weeks (5th month) of gestation and the risk of poor maternal outcome is noted to be high between 5th and 8th month. A degree of torsion of more than 1800 is associated with poor maternal outcomes.[1,2,5] Literature showed a decline in maternal mortality from 15.4% to 2.4% and this is attributed to improvement in timely intervention and resuscitation.[1,2,5] Furthermore, our review of gravid uterine torsion with placental abruption revealed no maternal mortality (Table 2).

Unlike maternal outcomes, perinatal mortality remains a challenge. Nesbit et al., Jensen, Wilson et al., and Ramseyer et al. reported 30.4%,12%,18% and 22% respectively.[1,2,4,5] Among the 11 cases investigated in our review, the overall perinatal mortality is 82% (9 cases) (Table 2). This indicates that patients who have associated placental abruption are at high risk of perinatal mortality. In our case, late presentation and degree of rotation contributed to maternal morbidity and fetal death.

CONCLUSION

In pregnancy-related acute abdominal emergencies, one has to keep in mind the possibility of uterine torsion due to its non-specific nature and dangerous impact. Our case and other reported literature showed that it can be obscured and associated with placental abruption especially when concealed and accompanied by maternal shock and fetal distress/ death in the third trimester. Early diagnosis and prompt laparotomy are crucial for favorable maternal and fetal outcomes. Assessing for anatomic landmarks before uterine incision helps in the diagnosis of uterine torsion and avoids inadvertent vascular and ureteral injuries during hysterotomy. Moreover, an attempt to reverse the torsion should be made always before doing a planned posterior hysterotomy.

ETHICAL APPROVAL

The patient provided informed written consent to use the clinical information and images for publication. Since it is a case report, approval from the institutional review board is not required.

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