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# Ethiopian Journal of Reproductive Health (EJRH)

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# ADHERENCE TO IRON–FOLIC ACID SUPPLEMENTATION AND ASSOCIATED FACTORS AMONG PREGNANT WOMEN AT FELEGE HIWOT COMPRESSIVE SPECIALIZED HOSPITAL, BAHIR DAR, ETHIOPIA

Semaw Minale Agidie, MD[1], Nitsuh Addis Tiru, MD[1]*, Abebaw Nigussie Ayele, MSc[2]

## ABSTRACT

**BACKGROUND:** Iron deficiency is the most significant contributor to the onset of anemia, accounting for 75% of anemia cases that occur during pregnancy worldwide. Adherence to iron and folic acid supplementation is one of the determinant factors to prevent anemia during pregnancy. Thus, this study aimed to assess the magnitude and associated factors for adherence of iron-folic acid supplementation among pregnant women.

**METHOD:** Cross-sectional study was conducted at Felege Hiwot Compressive Specialized Hospital from April 1 to August 30, 2019. Data was collected from 390 pregnant women who attended antenatal care follow-up using an interviewer-administered structured questionnaire and from clients' registry book. Descriptive analysis was done on socio-demographic, obstetric, and medical-related characteristics. Binary and multivariate logistic regression analysis was done to identify factors associated with adherence of iron-folic acid supplementation.

Results: 67.4% of pregnant women were adherent to iron-folic acid supplementation. Being counseled about IFAS (AOR=2.30; 95% CI: 1.21-4.34), having good knowledge about IFAS (AOR= 4.22; 95% CI: 2.43-7.31), more than 3 antenatal care visits (AOR=3.50; 95% CI: 1.55-7.92), having previous ANC follow up in tertiary hospital (AOR=2.61; 95% CI: 1.30-5.27), and having no history of hypertension (AOR=3.07; 95% CI: 1.37-6.89) were significantly associated with IFAS adherence. Lack of adequate counseling about anemia and IFAS mainly contributes to non-adherence.

**CONCLUSION:** In this study, counseling and knowledge about iron-folic acid supplementation, frequency of antenatal care visit and previous antenatal care follow-up center were significantly associated with adherence of iron-folic acid supplementation.

**KEYWORDS:** Adherence, Folic Acid, Iron, Pregnant Women.

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## INTRODUCTION

Anemia is a global public health problem affecting nearly 2 billion people worldwide[1]. About 41.8% of pregnant women and 30.2% of non-pregnant women are anemic worldwide[2]. The greatest burden of anemia in pregnant women is found in Africa, accounting for about 57.1% of the global anemic pregnant women[3]. The prevalence of anemia among pregnant women in Ethiopia is 22%, which makes it a moderate public health problem[2]. Iron deficiency is the most significant contributor to the onset of anemia, accounting for 50% of anemia cases worldwide and 75% of anemia cases occurring during pregnancy[1].

Anemia has significant adverse health consequences, as well as adverse impacts on social and economic development[4]. Low hemoglobin concentrations indicative of moderate or severe anemia during pregnancy has been associated with an increased risk of premature delivery, low birth weight, maternal and child mortality, and infectious diseases. It also affects growth and development both in utero and in the long term [5].

It is well established that women are at higher risk of iron deficiency and iron-deficiency anemia during pregnancy and they are often unable to meet the increased iron requirements of pregnancy from dietary sources alone. According to the WHO guidelines for control and prevention of micronutrient deficiencies, all pregnant women should take a standard dose of 60mg iron and 400µg folic acid daily for 6 months starting from the first month of pregnancy or at the time of their first antenatal visit. If the prevalence of anemia in pregnant women is high (40% or more), supplementation should continue for three months in the postpartum period[6].

Though many developing countries implemented iron-folic acid supplementation (IFAS) through antenatal care programs, only a few countries have reported significant improvement in preventing anemia[3]. Adherence to iron and folic acid supplementation is one of the determinant factors to preventing anemia during pregnancy[7]. Interventions to improve the adherence rate of iron during pregnancy including the use of directly observed therapy (DOT) and gastric delivery system (GDS) were found to be effective in improving adherence for iron during pregnancy [8, 9]. Poor adherence arises not only because of patient behavior, but also from factors out of the patient's control. Hence, this study aimed to assess the adherence level of pregnant women for IFAS and factors contributing to non-adherence.

## SUBJECTS AND METHODS

**Study area and period:** This study was conducted at Felege Hiwot Comprehensive Specialized Hospital, Bahir Dar, Ethiopia from April 1 to August 30, 2019.

**Study design:** Hospital-based cross-sectional study was applied.

**Study participants:** All pregnant women who started ANC follow-up at Felege Hiwot Comprehensive Specialized Hospital and started taking IFAS during the study period.

**Exclusion criteria:** Pregnant women who started taking IFAS not more than a month prior to the survey were excluded from the study (since they should take IFAS at least for a month prior to the survey to determine whether they were adherent or not).

**Sample size determination:** The desired sample size was calculated using single population proportion formula:

Where: $$n = \frac{z^2\, p(1-p)}{d^2}$$

n = total sample size

Z = 1.96 for 95% confidence level

p = proportion of pregnant women adherent to IFAS

d = 0.05 for 5% margin of error

Based on the literature [10], the value of p = 44%. Therefore, inserting all the above values into the equation and with a non-response rate of 10%, the total sample size was 416.

**Sampling procedure:** The study participants were selected using systematic random sampling. Data obtained from the ANC registry book showed that four months before the study period, around 846 clients visited Felege Hiwot Comprehensive Specialized Hospital for ANC services. Considering four months of data collection, a total population of 846 was used to calculate the sampling interval. Thus, by dividing the total population by the sample size, the sampling interval was found to be 2. After random selection of the first sample, every 2nd unit was included in the study.

**Data collection:** The data were collected using a structured, interviewer administered questionnaire and from the clients' registry book. The data was collected by midwives working at the ANC clinic and the completeness of the data was consistently checked by the principal investigators.

**Data processing and analysis:** The data were coded and entered into EPI-Info 7 and then exported into SPSS version 23 for analysis. Knowledge of anemia and IFAS was computed by adding 8 relevant knowledge questions (items on cause, complication, prevention, and others). A correct answer for each question was scored as "1" and an incorrect answer was scored as "0". Questions were summed up and the median was calculated. Descriptive statistics were computed to characterize sociodemographic characteristics and obstetric and medical conditions of the study participants. Binary and multivariate logistic regression analyses were done to identify factors associated with compliance with iron and folate supplementation. A level of $p < 0.05$ was considered statistically significant.

**Ethical consideration:** The research proposal was approved by the institutional review board of the College of Medicine and Health Sciences, Bahir Dar University, and permission to collect data was obtained from the medical director at FHCSH. Participants were provided with clear information and asked if they were willing to participate in the study. Data collection started after verbal informed consent was obtained from those who were willing to participate. Confidentiality of response was maintained throughout the study.

**Operational definition**

**Adherence to IFAS:** Pregnant women were considered as adherent to IFAS if they were able to take at least 4 IFAS tablets per week in the previous 1 month preceding the survey, otherwise; they were considered as non-adherent.

**Knowledge about anemia and IFAS:** Respondents were asked questions related to the cause, signs and symptoms, method of prevention, risk factors and consequences of anemia, and the benefits of IFAS. Accordingly, pregnant women who scored greater than or equal to the median value of correct responses were considered as having good knowledge about anemia and IFAS, otherwise, they were considered as having poor knowledge.

## RESULTS

**Socio-demographic characteristics of the study participants**

A total of 390 pregnant womenparticipated in the study, a response rate of 93.3%. The mean age of the study participants was 27.4 ± 5.1. Most of the study participants (82.1%, n=320) were in the age range of 20-34 years. About 95.1% (n=371) of the study participants were married and 63.3% (n=247) of them were housewives (Table 1).

**Table 1: Socio-demographic characteristics of the study participants, Felege Hiwot Comprehensive Specialized Hospital, Bahir Dar, Ethiopia, 2019.**

| Variables | Categories | Frequency | Percentage |
|---|---|---|---|
| Age (years) | < 20 | 23 | 5.9 |
| | 20-34 | 320 | 82.1 |
| | ≥ 35 | 47 | 12.0 |
| Marital status | Married | 371 | 95.1 |
| | Single | 19 | 4.9 |
| Residence | Urban | 207 | 53.1 |
| | Rural | 183 | 46.9 |
| Religion | Orthodox | 348 | 89.2 |
| | Muslim | 36 | 9.2 |
| | Protestant | 6 | 1.6 |
| Educational status | Can't read and write | 117 | 30.0 |
| | Can read and write | 66 | 16.9 |
| | Primary school complete | 60 | 15.4 |
| | High school complete | 70 | 18.0 |
| | College and above | 77 | 19.7 |
| Occupation | Housewife | 247 | 63.3 |
| | Government employee | 61 | 15.6 |
| | Merchant | 32 | 8.2 |
| | Other | 50 | 12.9 |

**Obstetric and medical history of the study participants**

About 36.4% (n=142) of the study participants were in their first pregnancy and 64.4% (n=251) of them were in the third trimester of their pregnancy. About 50.7% (n=198) of the study participants had three or more prior ANC visits and most of them (81.5%, n=318) were counseled about the importance of iron and folic acid supplementation during pregnancy. About 10.8% (n=42) and 6.7% (n=26) of the respondents had a history of anemia and hypertension respectively (Table 2).

**Table 2: Obstetric and medical history of the study participants, Felege Hiwot Comprehensive Specialized Hospital, Bahir Dar, Ethiopia, 2019.**

| Variables | Categories | Frequency | Percentage |
|---|---|---|---|
| Gravidity | I | 142 | 36.4 |
| | II-IV | 201 | 51.5 |
| | ≥V | 47 | 12.1 |
| Parity | 0 | 147 | 37.7 |
| | I-IV | 223 | 57.2 |
| | ≥V | 20 | 5.1 |
| Type of gestation | Singleton | 377 | 96.7 |
| | Twin | 13 | 3.3 |
| Gestational age | First trimester | 9 | 2.3 |
| | Second trimester | 130 | 33.3 |
| | Third trimester | 251 | 64.4 |
| Previous ANC follow-up center | Tertiary hospital | 171 | 43.9 |
| | Primary hospital | 52 | 13.3 |
| | Health center | 167 | 42.8 |
| Prior number of ANC visits | 1 | 42 | 10.8 |
| | 2 | 150 | 38.5 |
| | ≥ 3 | 198 | 50.7 |
| Counseled on the importance of IFAS | Yes | 318 | 81.5 |
| | No | 72 | 18.5 |
| History of anemia | Yes | 42 | 10.8 |
| | No | 348 | 89.2 |
| History of hypertension | Yes | 26 | 6.7 |
| | No | 364 | 93.3 |
| Hemoglobin level during time of interview (g/dl) | 7-10.9 | 46 | 11.8 |
| | ≥ 11 | 344 | 88.2 |

**Knowledge about anemia and IFAS and adherence to IFAS related characteristics**

Out of the 8 relevant knowledge questions, the median knowledge of the study participants about anemia and IFAS was found to be 5. About 67.9% (n=265) of the respondents had good knowledge of anemia and IFAS and 32.1% (n=125) of the respondents had poor knowledge of anemia and IFAS.

About 32.6% (n=127) of the study participants were non-adherent for IFAS (took less than 4 IFAS per week). The three most commonly cited reasons for non-adherence were fear of side effects of the tablet (45.7%, n=58), not being counseled on the importance of IFAS (19.7%, n=25), and fear of raised blood pressure if they took the tablets (18.9%, n=24) (Table 3).

**Table 3: Reasons for non-compliance to IFAS among the study participants, Felege Hiwot Comprehensive Specialized Hospital, Bahir Dar, Ethiopia, 2019.**

| Reasons for non-compliance | Frequency (n=127 | Percentage |
|---|---|---|
| Fear of side effects | 58 | 45.7 |
| Lack of counseling on IFAS importance | 25 | 19.7 |
| Fear of raised blood pressure | 24 | 18.9 |
| Forgetfulness | 16 | 12.6 |
| Fear of having a macrosomic baby | 13 | 10.2 |
| Family influence | 6 | 4.7 |
| Fear of harm for the baby and the mother from taking too many tablets | 5 | 3.9 |

**a = multiple responses is possible**

### Factors associated with adherence to Iron-folic acid Supplements

Table 4 evaluates factors associated with compliance to iron/folate supplementation. Among the risk factors assessed in the study participants, previous ANC follow up in a tertiary hospital (aOR=2.61; 95%CI: 1.52-4.51), being counseled on the importance of IFAS (aOR=2.30; 95%CI: 1.21-4.34), having no previous history of hypertension (aOR=3.34; 95%CI: 1.26-8.86) and having good knowledge about IFAS and anemia (aOR=4.22; 95%CI: 2.43-7.31) were significantly associated with adherence to IFAS than those who had ANC follow up at a health center, who weren't counseled about IFAS and having poor knowledge about IFAS and anemia, respectively.

In addition, having prior ANC visit of 2 times (aOR=2.93; 95% CI: 1.28-6.72) and 3 and more times (aOR=3.50; 95% CI: 1.55-7.92) were more likely to adhere to IFAS than those who had only one ANC visit.

**Table 4: Factors associated with adherence to IFAS in the study participants, Felege Hiwot Comprehensive Specialized Hospital, Bahir Dar, Ethiopia, 2019.**

| Variables | Categories | IFAS Adherence | | OR (95% CI) | aOR (95% CI) |
|---|---|---|---|---|---|
| | | Yes | No | | |
| Previous ANC follow-up center | Health center | 88 | 79 | 1.00 | 1.00 |
| | Primary hospital | 38 | 14 | 2.43 (0.99, 4.57) | 1.59 (0.68, 3.70) |
| | Tertiary hospital | 137 | 34 | 3.62 (2.23, 5.86) | 2.61 (1.52, 4.51) |
| Prior number of ANC visits | 1 | 17 | 25 | 1.00 | 1.00 |
| | 2 | 96 | 54 | 2.61 (1.30, 5.27) | 2.93 (1.28, 6.72) |
| | ≥ 3 | 150 | 48 | 4.60 (2.29, 9.22) | 3.50 (1.55, 7.92) |
| Counselled about IFAS | Yes | 233 | 85 | 3.84 (1.37, 6.89) | 2.30 (1.21, 4.34) |
| | No | 30 | 42 | 1.00 | 1.00 |
| History of hypertension | Yes | 11 | 15 | 1.00 | 1.00 |
| | No | 252 | 112 | 3.07 (1.37, 6.89) | 3.34 (1.26, 8.86) |
| Knowledge about IFAS and anemia | Good | 208 | 57 | 4.64 (2.94, 7.35) | 4.22 (2.43, 7.31) |
| | Poor | 55 | 70 | 1.00 | 1.00 |

## DISCUSSION

In our study, the overall adherence rate of pregnant women to iron and folic acid supplementation was 67.4% which is comparable with the study done in South India (64.7%), Nepal (73%), and Northern Ethiopia in Eritrean refugee camps (64.7%) [11-13]. However; it is higher than the study done in Debre Tabor General Hospital (44%), Mecha district, Northwest Ethiopia (20.4%), North-Western zone of Tigray, Ethiopia (37.2%), and Southeast Ethiopia (18%) [10, 14-16]. The higher proportion of IFAS adherence in our study might be attributed to the study site being at a tertiary hospital, as opposed to primary hospital and community-based study, which likely increases the provision of counseling about the importance of IFAS for most clients and results in better adherence.

Studies reported that knowledge about IFAS coupled with understanding of anemia and its relationship with IFAS is associated with improved adherence for IFAS [10-11, 17]. Our study also revealed that pregnant women who had good knowledge of anemia and IFAS were more likely to be adherent to IFAS. This might be because of having good knowledge of anemia and its association with IFAS drives their health seeking behavior.

Our study also showed that advising pregnant women about the benefits of IFAS significantly increased their adherence status. Our result is similar to the study done in Kiambu County, Kenya, at Mulago National Referral Hospital, Uganda, at Misha district, South Ethiopia, and in Mizan-Aman Town, Bench Maji Zone, Ethiopia [17-20]. This might be because advising pregnant women about IFAS increase their level of knowledge, and hence their adherence to IFAS.

Pregnant women who had frequent ANC attendance were reported to be more adherent to their iron supplements than their counterparts [18]. Our study indicated that those pregnant women who had more than one ANC attendance were more adherent to IFAS than those who had a single ANC visit. This might be due to the reason that those mothers who had repeated ANC visits could get better counseling and knowledge about the importance of IFAS which leads to a better adherence.

Our finding showed that pregnant women who had ANC follow-ups at a tertiary hospital were more adherent than those who had at a health center. This might be because ANC service providers at a tertiary hospital more likely have higher qualification and equipped with the necessary knowledge and provide better counseling to their clients which contribute to better adherence.

Pregnant women who had a history of hypertension were found less likely to be adherent to IFAS. As identified in this study, fear of increased blood pressure was one of the reasons for IFAS non-adherence. Clients likely misinterpreted the concept of IFAS increases blood cell synthesis as it increases blood pressure.

In our study, fear of side effects and not being advised on the importance of IFAS during pregnancy were among the common reasons for non-adherence. Our result is consistent with other studies [11, 14, 21-24]. As evidenced from these studies, health care provider's inadequate counseling about IFAS and anemia during pregnancy might lead to non-adherence.

## CONCLUSION AND RECOMMENDATIONS

In this study, those pregnant women who were counseled about IFAS, who had more than one ANC attendance, previous ANC follow-up in a tertiary hospital, and having good knowledge about anemia and its association with IFAS were more adherent to IFAS than their counterparts. There is a need to ensure adequate and satisfactory counseling about the significance of IFAS and its relationship with anemia, as well as managing side effects of IFAS to improve their adherence.

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# CLINICAL MANAGEMENT OF RAPE IN YAOUNDÉ-CAMEROON: A DESCRIPTIVE STUDY

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## ABSTRACT

**BACKGROUND:** Sexual assault is a global health and legal challenge. Nowadays it does not only affect women and girls, but also men and boys of all ages. Management of rape cases is dependent on the lesions and the trauma sustained by the survivors. In Cameroon, a protocol has been developed by the state to improve on the care of sexual assault survivors. There is therefore a need to evaluate the clinical management of rape in Yaoundé.

**MATERIALS AND METHODS:** This was a prospective descriptive study carried out over a period of 8 months among participants of all age groups visiting 3 referral hospitals in Yaoundé. A questionnaire was used to collect data of participants from medical records and the data collected was entered and analyzed using SPSS version 23.0.

**RESULTS:** During the study period, 127 cases of rape were recorded. The socio-demographic profile of survivors were mainly females (99.2%), with a mean age of 13 ± 10 years with the 10 to 15 age range being the most represented (25.2%). Vaginal penetration was common in most cases (85%). Sixty-one percent of survivors consulted at the hospital within 72 hours. The vaginal injuries were observed in the majority of survivors (42.5%) on clinical assessment. HIV serology and Hepatitis B were requested in 90.5% and 80.3% of cases respectively. Antibiotic was prescribed for 44.9% of survivors. Prevention of HIV infection by prescribing anti-retroviral was effective in 54% of cases. After the clinical examination, 33.9% of the victims had received emergency contraception. Psychological care was provided to the majority of the victims (85%).

**CONCLUSION:** Sexual assault remains a prominent fact of our society mainly affecting children. Preventing assault involves raising public awareness. The clinical management of survivors of rape needs to be improved on following the standard protocol provided by the government.

**KEYWORDS** – Sexual assault, Rape, Survivors, Management

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## INTRODUCTION

Sexual assault is a global health and legal challenge and has been a neglected area of research. Rape is a form of sexual assault, a public health problem and a human right violation [1]. The World Health Organisation (WHO) defines rape as physically forced or otherwise coerced 'penetration – even if slight – of the vulva or anus, using a penis, other body parts or an object [2]. Rape in war is internationally recognized as a war crime and a crime against humanity, but is also characterized as a form of torture and, in certain circumstances, as genocide [1].

Available data suggest that in some countries nearly one in four women may experience sexual assault by an intimate partner [3]. It is estimated that approximately 35% of women have experienced some form of sexual harassment in their lifetime [4]. Cameroon is not left out as to what concerns this dilemma. A report by Demographic and Health Survey, with Multiple Indicators (EDS-MICS) Cameroon in 2011 showed that the prevalence of sexual violence amongst females of any age in Cameroon is about 8%. [5]. Research carried out by Menick et al in Cameroon on child abuse among school children found that 38.7% of sexual assault cases involved rape [5]. Several authors who worked on sexual assault research in Cameroon worked on child sexual abuse and they found out that majority of these children had hymeneal and perineal tears [6]. In 2014, Foumane et al. evaluated the clinical aspects of sexual assault and reported that majority of the survivors came to consult for sexual assault, occurring mostly at night at the survivors or rapists home, mostly being physical trauma and the lesions were mostly vaginal [7, 8].

Management of rape cases is dependent on the lesions and the trauma sustained by the survivors.

Nonetheless, no matter the treatment received, rape has adverse physical, psycho-social consequences and also devastating effects on the lives of the survivors with long-term consequences on their health and mental wellbeing. It is associated with an increased risk of a range of sexual and reproductive health problems, with both immediate and long-term consequences [8].

Its impact on mental health can be as serious as its physical impact, and may be equally long lasting [9]. Sexual assault can also profoundly affect the social wellbeing of survivors; individuals may be stigmatized and ostracized by their families and others as a consequence [8,10].

## METHOD AND MATERIALS

### Research Design

This study was a descriptive prospective study.

### Research Sites

This study was carried out in three [3] referral hospitals in Yaoundé, Cameroon. These hospitals are the Yaoundé Central Hospital (YCH), the Yaoundé Gyneco-Obstetric and Pediatric Hospital (YGOPH) and the Yaoundé Emergency Center.

### Study Duration

This study was carried out within a period of 8 months (November 2019 to June 2020 inclusive).

### Study Population

The study population consisted of all patients received at the outpatient and emergency units of the three referral hospitals for sexual assault and who gave their consent or consent by their guidance.

### Inclusion criteria

We included in our study participants of all age groups received at the outpatient and emergency units of all our recruitment sites for sexual assault and who gave their consent or their guardian's consent.

### Exclusion criteria

We excluded:

- Survivors of sexual assault who were not rape cases;
- People who suffered from psychological trauma after consenting intercourse.

### Sampling

A consecutive and non-exhaustive sampling was done

### Sample Size

Using the Lorentz formula, our sample size was 127.

**Data collection**

Data collection was done at the consultation areas and for survivors who had been received for rape. A questionnaire was established and the data of participants were collected after consultation with the attending physician.

All eligible participants or their guardians were required to personally sign and date the latest approved version of an informed consent form before any study specific activities were undertaken. Written and verbal versions of the participant information and informed consent were presented to the participants detailing no less than: the exact nature of the study; what it involved for the participant; the implications and constraints of the protocol; any risks involved in taking part. It was clearly stated that the participant was free to withdraw from the study at any time for any reason without prejudice to future care, and with no obligation to give the reason for withdrawal.

The participants were allowed as much time as they wished to consider the information, and the opportunity to question the investigator, or other independent parties to decide whether they would participate in the study. Written informed consent/ assent was then obtained by means of participant dated signature and dated signature of the chief investigator. A copy of the signed informed consent was given to the participant. The original signed form was retained at the study site.

**Data Analysis and Presentation**

Data entry template was created in Epi-data version 3.1. Data was later transferred to and analyzed using Statistical package for social sciences version 23.0 in a password-protected computer. The results were then presented in the form of tables and figures using Excel 2013 software.

RESULTS

During the study period, 127 cases of rape were recorded with majority of the cases from the Yaoundé Gyneco-Obstetric and Pediatric Hospital (Figure 1).

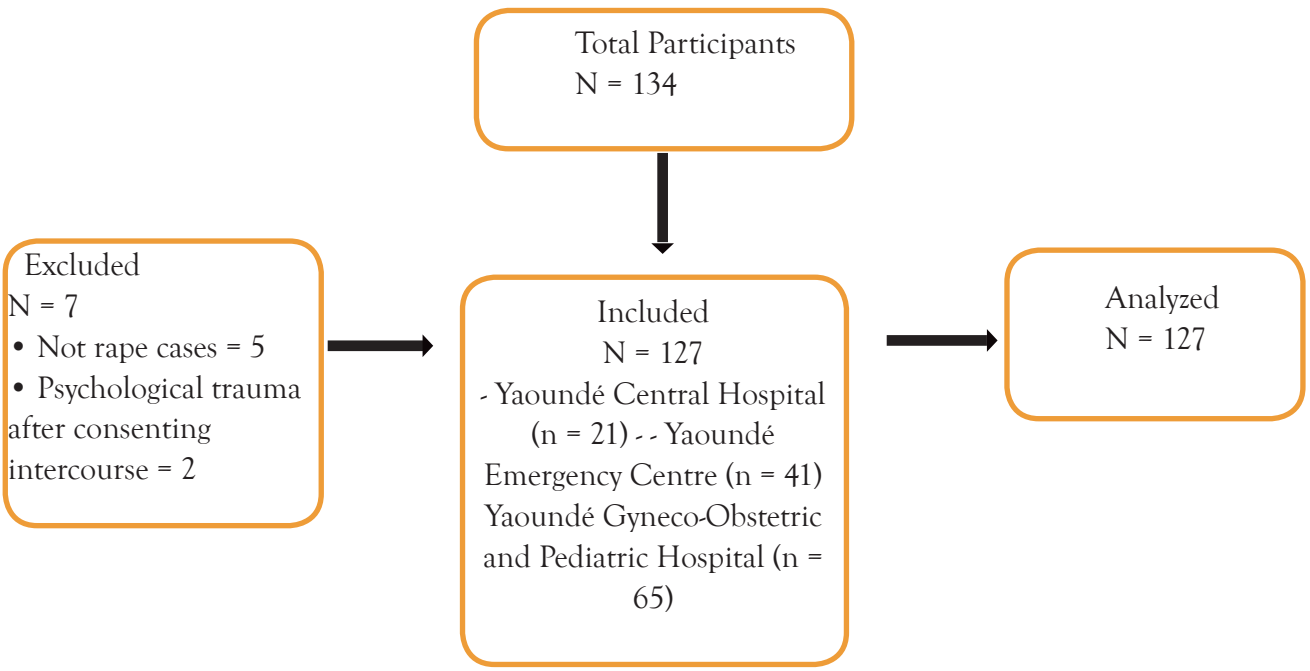


**Figure 1: Flow chart for recruitment of participants**

1. Socio-demographic characteristics of study population

The majority of the survivors in the study population were females. The 10 -15 age group was the most represented. Students were the most represented among survivors of rape (Table1).

**Table 1: Socio-demographic characteristics of the study population based on gender, age and profession (N = 127)**

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| **Gender** | | |
| Male | 01 | 0.8 |
| Female | 126 | 99.2 |
| **Age** | | |
| [1-5[ | 15 | 11.8 |
| [5-10[ | 25 | 19.7 |
| [10-15[ | 32 | 25.2 |
| [15-20[ | 18 | 14.2 |
| [20-25[ | 14 | 11.0 |
| [25-30[ | 13 | 10.2 |
| [30-35[ | 5 | 3.9 |
| [35-40[ | 2 | 1.6 |
| [40-45[ | 1 | 0.8 |
| [45-50[ | 2 | 1.6 |
| **Profession** | | |
| Student | 82 | 64.6 |
| Pupil | 16 | 12.6 |
| Public sector worker | 12 | 9.4 |
| Private sector worker | 17 | 13.4 |

2. Clinical characteristics of the assault

2.1. Type of Penetration

Vaginal penetration was the major form of penetration among the survivors (Table 2)

**Table 2: Distribution of study population according to type of Penetration (N = 127)**

| Type of Penetration | Frequency (n) | Percentage (%) |
|---|---|---|
| Vaginal | 108 | 85.0 |
| Anal | 10 | 7.9 |
| Vaginal-anal | 8 | 6.3 |
| Vaginal-oral | 1 | 0.8 |

2.2. Time to Consultation

A little over half of the survivors had come for consultation within the first 72 hours following the assault (Figure 2).

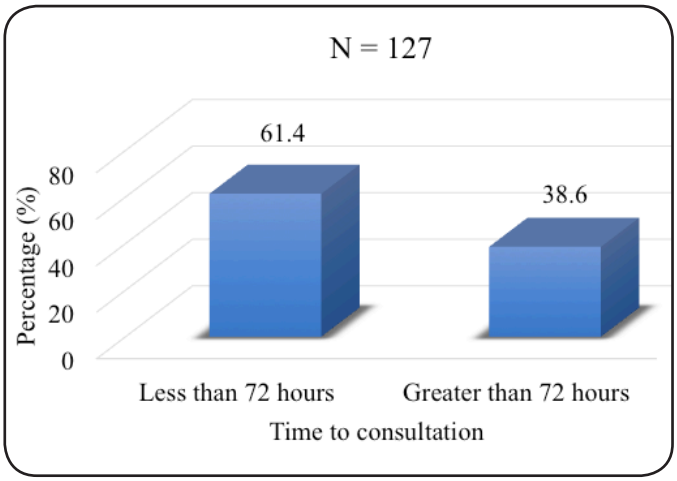


**Figure 2: Distribution of study population according to time to consultation**

2.3. Location of injury

The vaginal injuries were observed in the majority of survivors (Figure 3)

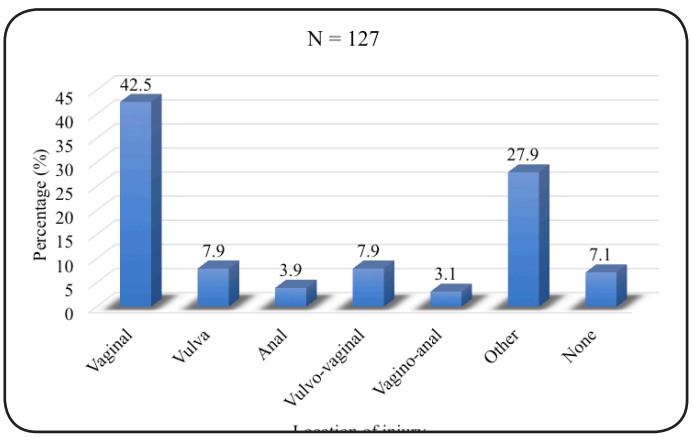


**Figure 3: Distribution of study population according to location of injury**

3. Management of survivors of sexual abuse

3.1. Paraclinical aspects

The HIV sample was collected in 90.5% of cases. Hepatitis B was collected in 80.3% of cases. A little over half of the survivors were prescribed Syphilis test. Vaginal smear and Chlamydia sample were collected in less than half of the cases. Pregnancy test was carried out in a little over half of the survivors (table 3)

**Table 3: Distribution of study population according to Paraclinical samples collected (N = 127)**

| Variable | CURYn (%) | YCHn (%) | YGOPHn (%) | Totaln (%) |
|---|---|---|---|---|
| HIV sample collected | | | | |
| Yes | 36 (87.8) | 21 (100) | 58 (89.2) | 115 (90.5) |
| No | 5 (12.2) | 0 (0) | 7 (10.8) | 12 (9.5) |
| Hepatitis B sample collected | | | | |
| Yes | 34 (82.9) | 21 (100) | 47 (72.3) | 102 (80.3) |
| No | 7 (17.1) | 0 (0) | 18 (27.7) | 25 (19.7) |
| Syphilis sample collected | | | | |
| Yes | 20 (48.8) | 13 (61.9) | 32 (49.2) | 65 (51.2) |
| No | 21 (51.2) | 8 (38.1) | 33 (50.8) | 62 (48.8) |
| Vaginal smear sample collected | | | | |
| Yes | 19 (46.3) | 12 (57.1) | 31 (47.7) | 62 (48.8) |
| No | 22 (53.7) | 9 (42.9) | 34 (52.3) | 65 (51.2) |
| Chlamydia sample collected | | | | |
| Yes | 19 (46.3) | 12 (57.1) | 31 (47.7) | 62 (48.8) |
| No | 22 (53.7) | 9 (42.9) | 34 (52.3) | 65 (51.2) |
| Pregnancy test | | | | |
| Yes | 23 (56.1) | 14 (66.7) | 27 (41.5) | 64 (50.4) |
| No | 18 (43.9) | 7 (33.3) | 38 (58.5) | 63 (49.6) |

4.2. Therapeutic aspects

The rate of antibiotic's prescrition is low. Post-exposure prophylaxis of HIV by prescribing anti-retroviral was effective in 54.3% of cases. Only 11.8% of survivors had received Hepatitis B immunization. Tetanus immunization concerned only 3.9% of the sexual assault survivors. Psychological care was provided to majority of the survivors (table 4)

**Table 4: Distribution of study population according to therapeutic management (N = 127)**

| Variable | CURYn (%) | YCHn (%) | YGOPHn (%) | Totaln (%) |
|---|---|---|---|---|
| Antibiotic Prescription | | | | |
| Yes | 20 (48.8) | 11 (52.4) | 26 (40.0) | 57 (44.9) |
| No | 21 (51.2) | 10 (47.6) | 39 (60.0) | 70 (55.1) |
| PEP prescription | | | | |
| TDF + 3TC + EFV | 13 (31.7) | 13 (61.9) | 29 (44.6) | 55 (43.3) |
| ZDV + 3TC + EFV | 6 (14.6) | 3 (14.3) | 1 (1.5) | 10 (7.9) |
| Combination unspecified | 0 (0) | 0 (0) | 4 (6.2) | 4 (3.1) |
| None | 22 (53.7) | 5 (23.8) | 31 (47.7) | 58 (45.7) |
| Emergency Contraception | | | | |
| Yes | 13 (31.7) | 13 (61.9) | 17 (26.2) | 43 (33.9) |
| No | 28 (68.3) | 8 (38.1) | 48 (73.8) | 84 (66.1) |
| Hepatitis B Immunization | | | | |
| Yes | 2 (4.9) | 2 (9.5) | 11 (16.9) | 15 (11.8) |
| No | 39 (95.1) | 19 (90.5) | 54 (83.1) | 112 (88.2) |
| Tetanus Immunization | | | | |
| Yes | 4 (9.8) | 1 (4.8) | 0 (0) | 5 (3.9) |
| No | 37 (90.2) | 20 (95.2) | 65 (100) | 122 (96.1) |
| Psychological Care | | | | |
| Yes | 35 (85.4) | 13 (61.9) | 60 (92.3) | 108 (85.0) |
| No | 6 (14.6) | 8 (38.1) | 5 (7.7) | 19 (15.0) |

## DISCUSSION

In our study we included 127 survivors of sexual assault. Majority of the survivors of rape in our study were female. This is similar to studies by several authors who found a predominance of female survivors of sexual assault [5–7,11]. This is common in our African culture that fosters beliefs of perceived male superiority and social and cultural inferiority of women. However, our study found that males were not excluded as victims of sexual assault. This is similar to the study carried out by Menick et al. [5] who had a frequency of sexual assault amongst male of 27.5%.

In our study, those aged 10 to 15 years were more represented. This high representativeness of minors was noted by several authors [5,6, 12-15]. This is also the case Mbaye et al., who had detected an average age of 13 years for victims [16]. However, Adinew et al. in a study carried out in Ethiopia among female university students found that more than half (57.4%) of the rape survivors were in the 18 to 20 years age group [17]. This is because their study focused mainly on University students.

In our study, 39.4% of the sexual assault took place at the victim's or rapist's home. These findings were similar to a study carried out by Faye et al. in Dakar, who found that 36% of rape cases took place at the victim's or rapist's home [18]. However, this was slightly lower in several studies in Cameroon [6,15,19].

Vaginal penetration was the major form of penetration among the survivors (85.0%). This rate is similar to that observed by Foumane et al. who had a rate of 87.8% in Cameroon [6] and slightly higher than the 67.3% [11], 65.8% [14] and 61% [20] observed by Traore, Diallo and Cisse in Senegal, respectively. These results justify once again the need to systematically prevent the occurrence of STIs, HIV infection and unwanted pregnancies in sexual assault survivors.

Survivors most often came for consultation within the first 72 hours following the assault (61.4%). This is similar to the rate of 58.5% reported by M. Diallo et al. in 183 cases at the Pikine National Hospital [14]. Cisse et al. reported slightly higher numbers in Senegal, with 70% of survivors consulting within 72 hours of the assault [20]. This delay is higher compared to studies in Brazil which reported 65% of survivors consulting within 24 hours [21]. Efforts to raise awareness still need to be made to reduce the delay, taking into account the need to prevent certain complications and to take samples in an emergency. Many survivors suffer from this silent dilemma often because they are ashamed or want to preserve family balance especially when the perpetrator is a family member. The lack of knowledge of medical confidentiality is another factor that may explain this delay in consultation. Hence the need for information work with young people to gain their trust, but also the need to set up specialized structures to deal with cases of sexual assault with the greatest discretion, such as medical and legal services.

In our study, 90.5% of survivors were prescribed an HIV serology. This is similar to studies carried out by Dupong [19] in Yaoundé and Diallo et al. in Dakar [14], who had a rate of 90.2% and 89.8%, respectively. However this is higher than the rates of 61.1% observed by Foumane et al. [6] and 10% observed by Mbaye et al. [16]. HBs Antigenemia was prescribed in more than 80.3% of cases. This corroborates with findings by Diallo et al. in Senegal [14]. Syphilis sample, vaginal smear and Chlamydia were collected in 51%, 48.8% and 48.8% of cases, respectively. This was similar to findings by Dupong in Cameroon with samples collected in less than 50% of cases [19]. Our study population consisted mainly of minors who had not been sexually active in the past and who were not at risk of infection thus the low prescription.

Pregnancy test was carried out in a little over half of the survivors (50.4%). This is in conformity with the fact that about half of our study population were in the post-pubertal stage with a likelihood of getting pregnant.

Antibiotic was prescribed in less than half of the survivors (44.9%) in our study population. This is closer to the rates of 38.9% observed by Foumane

et al. [6]. This corresponds to the percentage of victims who came within the period of effective antibiotic prophylaxis. However this rate, is higher than the 17% and 13.7% observed by Diallo et al. [14] and Cisse et al. [20] in Senegal, respectively. In other studies by Mbaye et al.in Senegal, Traore et al. in Mali and Facuri et al. in Brazil, the rate of prescription of antibiotics was 66.6% [16], 70.6% [11] and 86.5% [21], respectively.

Post-exposure prophylaxis (PEP) by prescribing anti-retroviral was effective in 54.3% of cases. Foumane et al. in Cameroon observed a 46.6% rate of antiretroviral prescription to the survivors [6]. This constitutes a limitation in the care of these survivors of sexual abuse as we know that many cases of infection to HIV/AIDS after rape have been reported in particular by Menick in Cameroon (37.5%) [22]. Our figures are low compared to the Brazilian figures with 90% of victims having PEP with antiretrovirals [21]. This is particularly alarming, especially as only one fifth of the victims of rape is known to consult a health care provider following rape occurrence in Cameroon [5]. We also observed that shortage in the antiretrovirals in Cameroon may have been a reason for the low prescription rate.

One third of the survivors received emergency contraception. This is low knowing that more than half of the survivors were in pubertal and post-pubertal stage. Mbaye [16] and Cisse [20] had similar results (34% and 37.8% respectively) in their study population in Senegal.

Only 11.8% of survivors had received Hepatitis B immunization. This is low compared to the 82.9% observed by Facuri et al. in Brazil [21]. This may be explained by the fact that most of the survivors may have received the Hepatitis B immunization as part of the government's routine Expanded Programme of Immunization (EPI).

Tetanus immunization concerned only 3.9% of the sexual assault survivors. This low rate is in conformity with the fact that threats were the commonest type of constraints used by the assaulters.

Psychological care was provided to majority of the survivors (85%). When we know that 95% of survivors of sexual violence develop significant mental impairment [23], these figures raise questions about the knowledge of mental damage to medical staff and the survivors themselves which should not be minimized in any of the survivors.

## CONCLUSION

We can conclude that :

- Rape is common in our setting among infants and adolescents, and single status, students.
- Survivors of rape arrived the hospital within 72 hours, with no past history of sexual assault and mainly vaginal lesions were observed on clinical assessment.
- HIV, Hepatitis B, Pregnancy test and Syphilis were the most common workups prescribed in more than half of survivors. Antibiotics, post-exposure prophylaxis, emergency contraception were prescribed in less than half of the survivors with some survivors not receiving psychological help.

## COMPETING INTERESTS

The authors have no conflicts of interest to declare for this study.

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# MAGNITUDE OF POSTPARTUM HEMORRHAGE AND ASSOCIATED FACTORS AMONG WOMEN DELIVERED AT HIDAR 11 HOSPITAL, NORTHEAST ETHIOPIA

Yitayish Damtie*[1], Bereket Kefale[1], Atsedemariam Andualem[2]

## ABSTRACT

**BACKGROUND:** Obstetric hemorrhage is the world's leading cause of maternal mortality; postpartum hemorrhage (PPH) is the most common type of obstetric hemorrhage causing considerable maternal mortality and morbidity. There was limited research on postpartum hemorrhage in the study area. Hence, this study aimed to assess the magnitude of postpartum hemorrhage and associated factors among women delivered in Hidar 11 Hospital.

**METHOD:** A retrospective cross-sectional study was conducted among 232 samples in Hidar 11 hospital from December 30/2018 to January 25/2019. A two-year (from December 1/ 2016 to December 1/2018) document review was conducted to select 232 samples. The collected data were analyzed using Statistical Package for the Social Sciences version 23. Bi-variable and multivariable logistic regression models were used to identify factors associated with postpartum hemorrhage. Adjusted Odds Ratio (AOR) with a 95% Confidence Interval (CI) was used as a measure of association. Statistical significance was declared at a P - value less than 0.05.

**RESULT:** The overall magnitude of postpartum hemorrhage was 12.1%. Being rural in residence (AOR=3.60, 95%CI: (1.36, 19.37)), pre-delivery hematocrit level ≤33% (AOR=3.36, 95%CI: (1.11, 10.1)), presence of premature rupture of membrane (AOR=4.68, 95%CI: (1.56, 14.0)) and gestational age> 42 week (AOR=17.1, 95%CI: (1.82, 161.3)) were significantly associated with postpartum hemorrhage.

**CONCLUSION:** The magnitude of postpartum hemorrhage was relatively higher as compared to other studies. Residence, pre-delivery hematocrit level, premature rupture of membrane and gestational age were factors associated with postpartum hemorrhage. Healthcare providers should give special attention for women who live in rural area, and those with anemia, premature rupture of membrane and post-term pregnancy.

**KEYWORDS:** Postpartum hemorrhage, antenatal care, uterine atony, Ethiopia

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## INTRODUCTION

Postpartum Hemorrhage (PPH) is defined as blood loss from the genital tract of 500 mL or more following a Normal Vaginal Delivery (NVD) or 1,000 mL or more following a cesarean section within 24 hours of delivery [1, 2]. PPH that occurs in the first 24 hours following delivery is regarded as primary PPH whereas any abnormal or excessive bleeding from the birth canal occurring between 24 hours and 12 weeks postnatal is regarded as secondary PPH [3, 4].

Maternal mortality remains a major health problem worldwide [5]. Globally, about half a million women die as results of pregnancy and childbirth complications and PPH is the leading cause of maternal deaths, responsible for about 127,000 deaths annually [6]. In sub-Saharan Africa (SSA), more than 50 % of maternal deaths occurred and the magnitude of PPH in SSA is 10.5 % [5, 7]. Ethiopia's maternal mortality ratio is among the highest in the world. According to the 2016 Ethiopian Demographic Health Survey (EDHS), the maternal mortality ratio of Ethiopia was 412/100,000 live births [8] and 10% of maternal deaths are attributed to PPH[9]. However, this figure is much lower than the African average (33.9%) [4] due to under-diagnosis, reporting and a very low ratio of health professionals to the public prevailing in Ethiopia[10]. Nearly 80% of PPH cases occur as a result of uterine atony, but genital tract trauma, uterine rupture, preexisting anemia, grand multiparty and coagulation disorder resulted in PPH [11-15].

Active Management of the Third Stage of Labor (AMTSL) became a key strategy for the prevention of PPH. It involves administration of a prophylactic uterotonic drugs after the delivery of a baby, early cord clamping and cutting, controlled traction of the umbilical cord and uterine massage. Although AMTSL is effective in reducing PPH [16], there are many cases of pregnant women who lose potentially deleterious amounts of blood despite AMSTL. A very recent study showed that the incidence of postpartum hemorrhage was still high (6.3%) [17]. Decreasing maternal mortality is one of the primary intervention areas of Sustainable Development Goals and Ethiopian health sector transformation plan which aimed to decrease the global maternal mortality ratio below 70 and 199 per 100,000 live births respectively [18, 19]. Hence, this study would have a paramount importance to provide evidence based interventions and achieve the aforementioned national and international commitments.

## MATERIALS AND METHODS

### Study area and period

A facility-based retrospective cross-sectional study was conducted from December 30 to January 25/2019 in Hidar 11 Hospital, which is located in Akesta town, South Wollo zone, Amhara Regional State. The Hospital is located 580 kilometers away from the regional city Bahir Dar and 501 kilometer from Addis Ababa, the capital city of Ethiopia. According to the 2018 woreda health office report, the total population of the catchment area was estimated to be 200,000 of which about 3.7% (7400) were reproductive-age women. In the two-years, (from December 1/2016 to December 1/2018) there were a total of 2679 deliveries in Hidar11 hospital. The source and study population were all mothers who visited Hidar 11 Hospital delivery room from December 1/ 2016 to December 1/ 2018.

### Sample size and sampling procedure

The sample size was calculated using Epi Info version 7.1 by taking the assumption of the percentage of postpartum hemorrhage among women who were grand multipara as 0.99%, the ratio of exposed to unexposed as one, AOR as 12.4, power 80% and confidence level 95% on a study done in Dessie Referral Hospital [20]. Thus, the minimum required sample size after adding a 10% non-response rate became 234.

All the unique medical registration numbers registered on the delivery and operation registration log books from December 1/2016 to December 1/2018 were selected and sorted in ascending order. Then, using the systematic random sampling technique, samples were selected in every eleven cards until the required sample size was obtained.

The first chart was selected by lottery method.

**Data collection procedures and measurement**

Data were collected by reviewing women's chart using structured data extraction checklist developed from literature. Five trained midwives collected the data with the supportive supervision of the principal investigator. Data collectors were trained for two days about the objective of the study, the content of the checklists and the data collection procedure. Before the actual data collection period, the data extraction checklists were pretested on twelve charts at Hidar 11 Hospital and necessary modification was done accordingly. The collected data were checked daily for completeness by the principal investigator.

The dependent variable of this study was PPH. A woman is said to have PPH if she is hypotensive (Blood pressure <90/60mmHg) and/or 10% hematocrit decrement from the pre delivery HCT level following excessive bleeding after vaginal or operative delivery as diagnosed by either gynecology and obstetrics specialist or emergency surgical specialist.

**Statistical analysis**

Data were checked for completeness, entered to Epi Data Version 3.1, and then exported to the Statistical Package for Social Science (SPSS) Version 23 statistical software for statistical analysis. Descriptive statistics like frequency, percentage and mean with Standard Deviation (SD) were computed and the result was presented using texts and tables. The association between independent variables and PPH was made by using a bi-variable binary logistic regression model and all independent variables having a p-value less than 0.25 were included in the multivariable binary logistic regression model. Hosmer and Lemeshow test was used to check model fitness. The statistical significance was determined using AOR along with a 95% CI and P-value; variables having a P-value less than 0.05, AOR with a 95% CI non-inclusive of one were considered as a statistically significant predictors of PPH in the final model.

**Ethical approval**

The ethical clearance was taken from the Ethical Review Committee of Wollo University College of Medicine and Health sciences. Permission to conduct the study was obtained from Hidar11 Hospital. The name or any other identifying information was not recorded on the questionnaire and all information that was taken from the chart was kept strictly confidential. The information retrieved was used only for the study purpose.

## RESULT

**Socio-demographic characteristics**

In this study, a total of 234charts were reviewed and 232 of them were included in the analysis. The mean age of the respondents was 28.02 years with ±5.3 SD. Eighty-nine (38.3%) women were between the ages of 30-34 years. One hundred twenty-nine women (55.6%) live in rural areas, 10 (4.3%) of the women walked greater than 30kms to reach the hospital and 114 (49.1 %) were house wife (Table 1).

**Table 1: Socio-demographic characteristic of the women delivered at Hidar 11 Hospital, 2019**

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| Age | | |
| 15-19 | 22 | 9.5% |
| 20-24 | 31 | 13.4% |
| 25-29 | 67 | 28.9% |
| 30-34 | 89 | 38.3% |
| >35 | 23 | 9.9% |
| Residence | | |
| Urban | 103 | 44.4% |
| Rural | 129 | 55.6% |
| Distance from the Health facility | | |
| 0-9 kilometers | 166 | 71.9% |
| 10-19 kilometers | 34 | 14.7% |
| 20-29 kilometers | 22 | 9.5% |
| >30 kilometers | 10 | 4.3% |
| Occupational Status | | |
| Housewife | 114 | 49.1% |
| Farmer | 87 | 37.5% |
| Civil Servant | 31 | 13.4% |

**Obstetric characteristics**

Ninety-six (41.4%) women were primi-gravida, 209 (90.1%) women had at least one ANC follow-up, 12 (5.2%) women experienced multiple pregnancies and 174 (75%) of pregnancies were term pregnancy. The mean pre-delivery hematocrit level was 38.4 with an SD of ±3.7. One hundred seventy-seven (76.3%) women experienced the spontaneous onset of labor, 225 (97%) of women had a duration of labor less than 24 hours and 67 (28.9%) of women experienced premature rupture of membrane respectively. Two hundred sixteen (93.1 %) women delivered at Hidar 11 Hospital, 137(59%) of the deliveries were attended by midwives and 149 (64.2%) deliveries were spontaneous vaginal delivery respectively (Table 2).

**Table 2: Obstetric characteristic of the women delivered at Hidar11 Hospital, 2019**

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| **Parity** | | |
| Primi-para | 96 | 41.4% |
| Multi-para | 117 | 50.4% |
| Grand multipara | 19 | 8.2% |
| **ANC visit during the last pregnancy** | | |
| Yes | 209 | 90.1% |
| No | 23 | 9.9% |
| **Type of pregnancy** | | |
| Singleton | 220 | 94.8% |
| Multiple | 12 | 5.2% |
| **Gestational age of the pregnancy** | | |
| <37 weeks | 50 | 21.6% |
| 37-42 weeks | 174 | 75% |
| >42 weeks | 8 | 3.4% |
| **Pre-delivery hematocrit level** | | |
| >33% | 175 | 75.4% |
| ≤33% | 57 | 24.6% |
| **History of PPH in the previous pregnancy** | | |
| Yes | 2 | 0.9% |
| No | 230 | 99.1% |
| Onset of labor | | |
| Spontaneous | 177 | 76.3% |
| Induced | 55 | 23.7% |
| Duration of labor | | |
| <24 hours | 225 | 97.0% |
| ≥24 hours | 7 | 3.0% |
| **Presence of premature rupture of membrane** | | |
| Yes | 67 | 28.9% |
| No | 165 | 71.1% |
| **Weight of the baby** | | |
| <2500 gram | 58 | 25% |
| 2500-4000 gram | 170 | 73.3% |
| >4000 gram | 4 | 1.7% |
| **Place of delivery** | | |
| Health center | 9 | 3.9% |
| Hospital | 216 | 93.1% |
| Othersa | 7 | 3.0% |
| **Delivery attendant** | | |
| Midwifes | 137 | 59% |
| Emergency surgery or **gynecology and obstetrics** specialist | 92 | 39.7% |
| Traditional birth attendants | 3 | 1.3% |
| **Mode of delivery** | | |
| Spontaneous vaginal | 149 | 64.2% |
| Cesarean section | 54 | 23.3% |
| Instrumental delivery | 29 | 12.5% |

a, In the way to the health institution, at home and private clinics

**Magnitude of postpartum hemorrhage**

In the two-year periods, the overall prevalence of PPH was 12.1 % (95%CI (8.5, 16.4)). Almost half of the cause of PPH was uterine atony 14 (50%) followed by retained placenta 9 (32.1%) and genital tear 5 (17.9%).

**Factors associated with postpartum hemorrhage**

Both bi-variable and multivariable binary logistic regressions were done to determine predictors of PPH. In the multivariable analysis, being rural in residence, pre-delivery hematocrit level ≤33%, presence of premature rupture of membrane and gestational age greater than 42 weeks were significant predictors of PPH. As a result, those women who live in rural areas were 3.6 times more likely to develop PPH as compared to those women who live in urban areas (AOR=3.603, 95%CI: (1.36, 19.4)). Mothers who had pre-delivery hematocrit level ≤33% were 3.3 times more likely to develop PPH than whose mothers who had pre-delivery hematocrit level >33% (AOR=3.360, 95%CI: (1.11, 10.2)). Delivered mothers who experienced premature rupture of the membrane were 4.7 times more likely to develop PPH as compared to mothers who didn't experience the premature rupture of membrane (AOR=4.7, 95%CI: (1.6, 14.0)) and mothers with a gestational age of greater than 42 weeks were 17 times more likely to develop PPH as compared to mothers who had a gestational age of fewer than 37 weeks (AOR=17.1, 95%CI: (1.82, 161.3)) (Table 3).

**Table 3: Factors associated with postpartum hemorrhage among women delivered at Hidar 11 Hospital, 2019**

| Variable | PPH(n=232) | | COR(95%CI) | AOR(95%CI) |
|---|---|---|---|---|
| | Yes | No | | |
| Residence | | | | |
| Urban | 6(5.8%)` | 97(94.2%) | 1 | 1 |
| Rural | 22(17.1%) | 107(82.9%) | 3.32(1.29,8.54) | 3.60(1.36,19.4)** |
| ANC follow up | | | | |
| Yes | 23(11%) | 186(89%) | 1 | 1 |
| No | 5(21.7%) | 18(78.3%) | 2.25(0.89, 11.2) | 2.71(0.91, 14.3) |
| Onset of labor | | | | |
| Spontaneous | 19(10.7%) | 158(89.3%) | 1 | 1 |
| Induced | 9(16.4%) | 46(83.6%) | 1.63(0.23, 9.42) | 1.89(0.56, 11.7) |
| Pre-delivery hematocrit level | | | | |
| ≤33% | 14(24.6%) | 43(75.4%) | 3.74(1.66,8.44) | 3.36(1.11,10.2)*** |
| >33% | 14(8.0%) | 161(92%) | 1 | 1 |
| Presence of premature rupture of membrane | | | | |
| Yes | 17(17%) | 50(75.4%) | 4.58(1.98,10.2) | 4.7(1.6,14.0)* |
| No | 11(6.7%) | 154(93.3%) | 1 | 1 |
| Gestational age | | | | |
| <37 weeks | 8(16.0%) | 42(84.0%) | 1 | 1 |
| 37-42 weeks | 17(9.8%) | 157(90.2%) | 0.57(0.23,1.40) | 0.73(0.23,2.29) |
| >42 weeks | 3(37.5%) | 5(62.5%) | 3.15(0.63,15.9) | 17.1(1.82,161.3)** |
| Type of pregnancy | | | | |
| Singleton | 25(11.4%) | 195(88.6%) | 1 | 1 |
| Multiple | 3(25%) | 9(75%) | 2.6(096, 21.8) | 2.23(0.35, 29.1) |

COR crude odds ratio; AOR adjusted odds ratio; PPH; Postpartum Hemorrhage *Significant at P<0.05; ** significant at P<0.01; *** significant at P ≤ 0.001 in the bi-variable and multivariable logistic regression analysis

COR crude odds ratio; AOR adjusted odds ratio; PPH; Postpartum Hemorrhage *Significant at P<0.05; ** significant at P<0.01; *** significant at P ≤ 0.001 in the bi-variable and multivariable logistic regression analysis

## DISCUSSION

In the two-year period, the overall prevalence of PPH was 12.1 %, (95%CI (8.5, 16.4)). Being rural in residence, pre-delivery hematocrit level ≤33%, presence of premature rupture of membrane and gestational age >42 weeks were significant predictors of PPH.

The prevalence of PPH was consistent with a study done at Gondar town (14.8%) [12] and Bedele Hospital (9.69%) [21]. It is higher than studies conducted at Dessie Referral Hospital (5.8%) [20] and Debre Tabor General Hospital (7.6%) [22]. However, the prevalence of PPH in this study was lower than a study conducted at Cameroon district Hospital which was 23.6% [23]. This discrepancy could be due to the difference in study period, difference in the concern of government towards maternal and child health, health service utilization and coverage across various settings. The other potential reason could be due to delivery and ANC services quality improvement through time. ANC is an important maternal health interventional area, which reduces the occurrence of PPH by providing early diagnosis and treatment of preexisting disease and complications, developing birth preparedness and complication readiness plan and health promotion and disease prevention actions like, nutritional supplementation which are essential to decrease pregnancy and child birth complications like PPH.

In this study, being rural in residence had a positive association with PPH. This might be due to the lack of 24-hour ambulance services in rural areas, lack of awareness, poor road construction and its distance from the health institution, which leads to delay in deciding to seek care and delay in the way to reach the health institution.

Pre-delivery hematocrit level ≤33% had a significant association with PPH similar to other studies [24-26]. The reason could be women with anemia are more likely to develop uterine atony due to impaired oxygen transport to the uterus as a result of low hemoglobin level which in turn leads to postpartum hemorrhage [27].

The study showed that the presence of premature rupture of the membrane also had a significant association with PPH. The reason behind this could be patients with the premature rupture of the membrane might have a risk of developing chorioamnionitis that leads to uterine atony which is the cause of secondary PPH [28]. It could also increase the risk of operative deliveries, induction and augmentation of labor, which in turn increase the risk of developing PPH.

Post-term pregnancy also had a positive association with PPH in contrast to the study conducted in Uganda [14]. This might be because post-term pregnancy may increase risk of fetal macrosomia that causes uterine over distension, which is a risk for uterine atony and operative delivery that resulted in PPH [29].

As a limitation, since this study used secondary data, detailed assessment of some potential predictor variables could not be addressed due to lack of documentation and incomplete information. Being a facility-based study is another potential limitation since it could not be generalized to the general population.

## CONCLUSION

The magnitude of postpartum hemorrhage was relatively higher as compared to other studies. Residence, pre-delivery hematocrit level, the premature rupture of membrane and gestational age were factors associated with PPH. Healthcare providers should screen and treat women for infection and anemia during their ANC visit and arrange a 24 hours ambulance service for those who live in rural areas. Special attention should also be given for women with premature rupture of membrane and post-term pregnancy.

## ABBREVIATIONS

AMTSL-Active Management of the Third stage of Labor; AOR-Adjusted Odds Ratio; ANC-Antenatal Care; CI-Confidence Interval; EDHS-Ethiopian Demographic and Health Survey; NVD-Normal

Vaginal Delivery; PNC-Postnatal Care: PPH-Postpartum Hemorrhage; SD-Standard Deviation; SPSS- Statistical Package for Social Science; SSA-Sub Saharan Africa.

## CONFLICTS INTEREST

The authors declared that there are no potential conflicts of interest concerning the publication of the article.

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# THE MAGNITUDE AND DETERMINANTS OF INDUCED ABORTION AMONG COLLEGE STUDENTS AT DEBRE TABOR TOWN, DEBRE TABOR, ETHIOPIA

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## ABSTRACT

**BACKGROUND:** Globally, 358,000 women die each year as a result of causes related to pregnancy and childbirth. Abortion is one of the top five causes of maternal death in Ethiopia. Therefore, this study was conducted to assess the magnitude and associated factors of induced abortion among college students in Debre Tabor town.

**METHODS:** An institution based cross-sectional study was conducted from February 3 to May 28, 2021. A total of 236 female students were recruited from Debre Tabor Health Science College, Begiemidir Educational College and Fekede Egzi College using simple random sampling technique. The data were collected using self-administered questionnaire, and data analysis was done by SPSS version 25.0.

**RESULT:** The prevalence of induced abortion was 18.6%. Department, year of study and condom use were significantly associated with the occurrence of induced abortion. Compared to non-health science students, medical laboratory students and HIT students were 4.9 (1.535-15.39) and 13.9 (3.965- 49.045) times practiced induced abortion respectively. After controlling other variables, second year students were 10.8 (1.205- 96.782) times more likely to encounter induced abortion than third year students. Those who did not use condoms were 3.25(1.319-7.9940) times more likely to engage in practicing induced abortion.

**CONCLUSION:** The prevalence of induced abortion was generally high in the study area. Department, year of study and condom use were strongly associated with induced abortion.

**KEY WORDS:** Induced Abortion; Debre Tabor town; Ethiopia.

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## INTRODUCTION

Abortion is a sensitive and contentious issue with religious, moral, cultural, and political dimensions, and is a public health concern in many parts of the world, as a common practice in most cultures and society [1,2]. Abortion is defined as termination of pregnancy prior to 20 weeks' gestation or a fetus less than 500-grams of birth weight [3]. Abortion can be classified as spontaneous (which can further be sub-classified as threatened, inevitable, incomplete, complete or missed abortion), induced abortion and therapeutic abortion. Induced abortion can be safe or unsafe. Unsafe abortion is a procedure for termination of pregnancy either by a person lacking the necessary skills or in an environment lacking minimal medical standards or both [3]. Safe induced abortion refers to the deliberate termination of pregnancy either through surgical procedures or by pharmacological means. An estimated 56 million induced abortions occurred each year worldwide, out of which safe abortion and unsafe abortion accounted as 55% and 45% per annum respectively. In 2012, The Ethiopian Parliament changed the ground for abortion, which paved the way for access to safe abortion service and reduced the burden of unsafe abortion along with its complications, and set further indications which include cases of pregnancy from rape, incurable fetal deformities, women's physical or mental disabilities, or lack of physical or mental maturity for childbirth due to younger age [4].

One-third of the world's women lack access to legal or safe abortion, of whom 330 maternal deaths per 100,000 occur as a result of abortion related procedures [5]. Every day, approximately 1000 women die from preventable causes related to pregnancy and childbirth and 99% of all maternal deaths occur in developing countries [6]. The high proportion of unintended pregnancies and abortion in Ethiopia contributes to one of the highest maternal mortality rates (MMR)in the world [7]. The top five causes of maternal death in Ethiopia are hemorrhage, unsafe abortion (contributed 18% of all maternal deaths in eastern Africa), sepsis, hypertensive disorders of pregnancy and obstructed labor [8]. The rate of abortion among Ethiopian college students was found to be 65 per 1000 women of reproductive age, and 96.9% of all the abortion cases were found to be induced whilst only half were reported to be safe abortion [9].Some national studies conducted in Ethiopia reported that the prevalence of induced abortion and its negative consequences are increasing in the country [2,4,10].

As per the report of studies conducted in Addis Ababa and Jimma town; early marriage, contraception use, place of residence, age younger than 19, being on primary educational level and second trimester pregnancy were found to increase the likelihood of induced abortion [11,12]. Despite the presence of some studies done in different parts of Ethiopia on this title, no previously conducted studies at colleges of Debre Tabor town are available. Therefore, this is the first study of its kind aimed at assessing the magnitude and associated factors of induced abortion among Ethiopian college students in Debre Tabor town. The finding might also be used as a baseline data for conducting further related studies in the future.

## METHOD AND MATERIALS

### Study design, area and period

Institution based cross sectional study design was employed, and the study was conducted in Debre Tabor Health Science College, Fekede Egzi College and Begiemidir Educational College, which are found in Debre Tabor Town, from February 3 to May 28, 2021. Debre Tabor Town is found in South Gondar Zone of Amhara Region in Ethiopia, and is about 667 kilometers far from Addis Ababa, the capital city of Ethiopia. There are 6 colleges in the town, of which three are private (Guna Tabor, Fekede Egzi and Sebastopol College), and the remaining are governmental colleges (Debre Tabor Health Science College, Begiemidir Educational College and Polytechnic College).

### Population

We enrolled a total of 236 participants, of which 96 were recruited from Debre Tabor Health

Science College, 60 from Fekede Egzi College and the remaining 80 participants were recruited from Begiemidir Teachers' College proportionally through simple random sampling technique, who were attending class in 2020/2021. Female students in reproductive age, and those who came to Debre Tabor Health Science College, Fekede Egzi College and Begiemidir Educational' College during the study period were included in the study. The 3 colleges were selected by lottery method.

**Sample size determination and Sampling technique**

The sample size was determined using a single population proportion formula with the assumption of 95% confidence interval, margin of error 5% and the proportion of induced abortion among college students(P) 43.3% [3].

Thus, after reduction using correction formula (since the total population was less than 10,000) and after adding 5% non-response rate, a final sample size(n) of 240 was obtained. Female students in all health science departments (midwifery, nursing, medical laboratory technician, HIT) and non-health science departments (accounting, management, civics and physical education) both in regular and extension programs available during the study period were involved proportional to their number in each department. Then simple random sampling technique, using the list of students as a sampling frame, was used to select eligible students from each department.

**Study Variables**

Magnitude of induced abortion (yes/no) was taken as a dependent variable, while socio demographic factors (age, marital status, religion, residence), department, year of study, alcohol use, emergency contraceptive use, condom use, knowledge on legality of abortion were independent variables of our study.

**Data collection procedures and Analysis**

The data were collected using pretested self-administered structured questionnaires and analyzed using SPSS version 25.0. Results of the variables such as socio-demographic factors, sexual and reproductive history of the participants were expressed in descriptive form of percent, frequency and mean. Additionally, binary and multivariate logistic regression models were used to identify the presence of association between independent variables and the dependent variable, and was expressed in terms of crude odds ratio (COR) and adjusted odds ratio (AOR) respectively. Data quality was assured through pretested questionnaires and by providing training for data collectors. The questionnaires were also checked for completeness, consistency and coherence daily.

## RESULT

A total of 236 study participants with a response rate of 98.4% were involved in this study. Age range of the respondents was between16 and 34 with a mean age of 22.2±3.3. Concerning marital status of the study participants, the majority (73.3%) were single, and large proportion of them (77.5%) were orthodox in terms of religion. Regarding their residence, 40.7% and 59.3% of the study subjects were urban and rural dwellers respectively.

**Table 1: Socio-demographic characteristics of study participants at colleges of Debre Tabor town, June 2021.**

| Variables | Category | Frequency (n) | Percent (%) |
|---|---|---|---|
| Age | 15-19 | 48 | 20.3 |
| | 20-24 | 138 | 58.5 |
| | 25-29 | 42 | 17.8 |
| | 30+ | 8 | 3.4 |
| Marital status | Single | 173 | 73.3 |
| | Married | 51 | 21.6 |
| | Divorced | 9 | 3.8 |
| | Widowed | 3 | 1.3 |
| Religion | Orthodox | 183 | 77.5 |
| | Muslim | 39 | 16.5 |
| | Catholic | 6 | 2.5 |
| | Protestant | 7 | 3.0 |
| | Other | 1 | 0.4 |
| Residence | Urban | 96 | 40.7 |
| | Rural | 140 | 59.3 |
| Income | < 1000 | 141 | 59.7 |
| | ≥ 1000 | 91 | 40.2 |

As per the result of this study, the total number of students under the department of midwifery, nursing, medical laboratory technology and health informatics were 30(12.7%), 18(7.6%), 42 (17.8%) and 22(9.3%) respectively. On the other hand, non-health science departments (accounting, management, civics and physical education) altogether constituted 124(52.5%) students respectively (Figure 1). Out of 236 respondents 196(83.1%) were first year, 22(9.3%) were second year and 18 (7.6%) were on their third year of study.

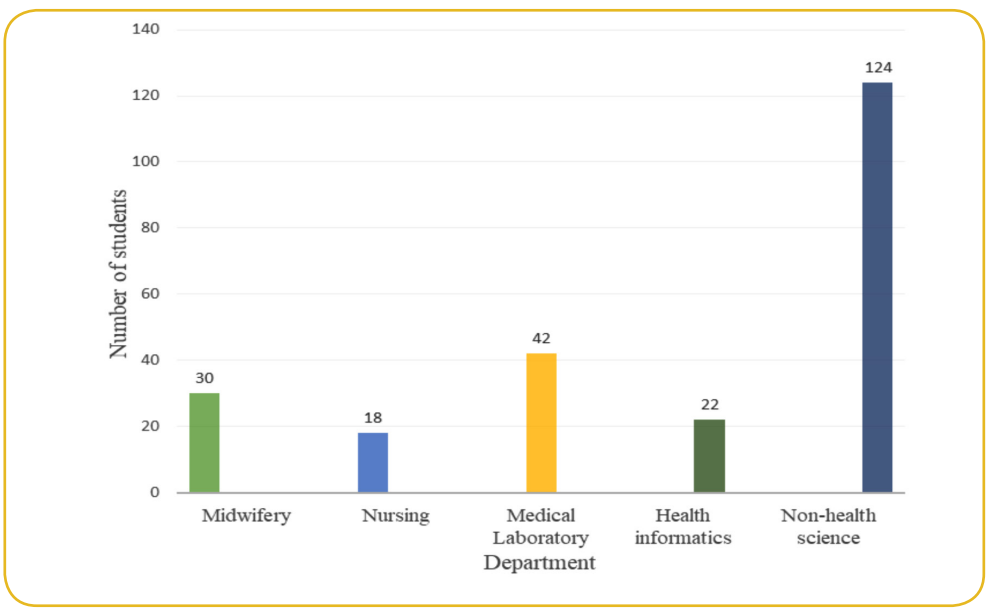


**Figure1: Diagrammatic representation of study participants' field of study in colleges of Debre Tabor Town, June 2021.**

Among 236 respondents, 166 (70.3%) of them had sexual intercourse at least once, and the remaining 70(29.7%) respondents have not had sexual intercourse yet. Regarding condom use, 63 (26.7%) have used condom during their sexual intercourse activity, whilst 173 (73.3%) did not use. Out of the total study participants, 91(38.6%) used emergency contraceptive pills once they had unprotected sexual intercourse. A total of 94 (39.8%) respondents reported that they had used alcohol at some point during their previous lifetime. Out of the total respondents, 87 (36.9%) participants became pregnant, and 40.2% of the pregnancies were planned.

Out of the total study participants, 155 (65.7%) had some knowledge about conditions under which abortion is considered to be legal in Ethiopian context. Concerning participant awareness on legality of abortion as per Ethiopian law, the vast majority of study participants (38.7%) knew all the conditions under which legality of abortion is ensured in Ethiopia, and very small percentage (3.9%) of participants did know only one reason, more specifically, pregnancy unwholesome for the mother's life or pregnant mother with mental or physical impairment, for abortion to be considered legal (Table 2).

**Table 2: Respondents' awareness on legality of abortion as per Ethiopian law in colleges of Debre Tabor Town, June 2021.**

| Conditions which make abortion legal | Frequency of participants (Yes) | Percent |
|---|---|---|
| Pregnancy due to rape | 31 | 20 |
| Pregnancy from close kin/relative | 25 | 16.1 |
| Pregnancy unwholesome to the mother's life | 18 | 11.6 |
| Pregnancy having potential danger for fetal health | 6 | 3.9 |
| Pregnancy leading to fetal abnormalities | 9 | 5.8 |
| Pregnant mother with mental or physical impairment | 6 | 3.9 |
| All the above reasons/ conditions | 60 | 38.7 |
| Total | 155 | 100 |

In our study, the overall prevalence of induced abortion was found to be 18. 6%. Out of those who had history of induced abortion, 24(54.5%) did complete the process at home,14 (31.8%) did it in governmental health institutions, and the remaining 6 (13.7%) did so at private clinics. Regarding the number of times of abortion, 45 (77.6%) study participants aborted only once, 10 (17.2%) aborted twice, 1 (1.8%) aborted thrice and 2(3.4%) had abortions more than three times (Table 3).

**Table 3: Abortion related statuses of study participants at colleges of Debre Tabor town, June 2021**

| Variables | | Frequency and percentage |
|---|---|---|
| History of abortion | Yes | 58(24.6) |
| | No | 178(75.4) |
| Type of abortion | Spontaneous | 14(24.1) |
| | Induced | 44(75.9) |
| Number of times of abortion | Once | 45(77.6) |
| | Twice | 10(17.2) |
| | Thrice | 1(1.8) |
| | More than three times | 2(3.4) |
| Place of induced abortion | Home | 24(54.5) |
| | Health Institutions | 14(31.8) |
| | Private clinics | 6(13.7) |

Numbers in parenthesis indicate percentage for corresponding variables

Among the respondents who had history of induced abortion at home, 9(37.5%) of them did so using over the counter drugs, 10(41.7%) of them used traditional herbal medications, 3(12.5%) used physical methods and the remaining 2(8.3%) used other methods to undertake the abortion. Regarding complications faced during the procedure of induced abortion, 27(61.4%) respondents had faced complications, namely; severe bleeding (37%), abortion related infections (18.5%), severe pain (29.6%), recurrent abortion (7.4%) and infertility (7.4%).

**Factors Associated with Induced Abortion**

Eleven dependent variables were entered to binary logistic regression then after variables that had a p-value of less than 0.25 were entered to multivariable logistic regression. Among the variables entered into multivariable logistic regression three variables, namely; department, year of study and condom use were significantly associated with prevalence of induced abortion.

The result of this study showed that medical laboratory students were 4.9 (1.535- 15.39) times more victims of induced abortion than health extension students. HIT students were 13.9(3.965-49.045) times more likely to practice induced abortion than health extension students. With respect to year of study, second year students had 10.8 (1.205- 96.782) times more chance of undertaking induced abortion than third year students. Those who had used condom were 3.25(1.319-7.9940) times more likely to engage in practicing induced abortion than those who did not use it (Table 4).

**Table 4: Association between prevalence of induced abortion and independent variables at colleges of Debre Tabor town, June 2021**

| Variable | Category | Significance of COR | COR | Significance of AOR | AOR |
|---|---|---|---|---|---|
| Marital status | Single | 0.060 | 0.097(0.01-1.10) | 0.763 | 0.600(0.022-16.63) |
| | Married | 0.081 | 0.107(0.01-1.31) | 0.702 | 0.5159(0.17-15.47) |
| | Widowed | 0.736 | 0.625(0.040-9.650) | 0.478 | 3.711(10-13.8) |
| | Divorced | 0.571 | 1 | 1 | |
| Department | Midwifery | 0.609 | 0.667(0.141-3.151) | 0.476 | 0.485(.066-3.539) |
| | Nursing | 0.008 | 4.667(1.483-14.689) | 0.218 | 2.499(.582-10.726 ) |
| | Medical laboratory | 0.001 | 4.66(1.945-11.197) | 0.007* | 4.860(1.535- 15.390) |
| | HIT | 0.000 | 7.778(2.780-21.763) | 0.000* | 13.945(3.965-49.045) |
| | *Others | 0.000 | | | 1 |
| Year of study | First | 0.503 | 1.679(0.369-7.644 ) | 0.151 | 4.424(.580-33.736) |
| | Second | 0.081 | 4.571(0.829-25.211) | 0.033* | 10.799(1.205-96.782) |
| | Third | 0.006 | 1 | | 1 |
| Residence | Urban | 0.165 | | | |
| | Rural | 0.000 | 1 | 1 | |
| Condom Use | Yes | 0.001 | 3.261( 1.646-6.458) | 0.010* | 3.247(1.319-7.9940) |
| | No | 0.000 | 1 | 1 | |
| History of post-pill use | Yes | 0.007 | 2.512(1.290-4.093) | 0.112 | 2.050(0.8464-0.9640) |
| | No | 0.000 | 1 | 1 | |
| Alcohol use | Yes | 0.129 | 1.667(.862-3.222) | 0.613 | 0.794( 0.324-1.946) |
| | No | 0.000 | 1 | 1 | |
| Knowledge on abortion | Yes | 0.152 | 1.721(.819-3.618) | 0.454 | 1.424(0.564-3.591) |
| | No | 0.000 | 1 | 1 | |

*others(accounting, management, civics and physical education)

## DISCUSSION

In our study, 59.8% of the participants faced unplanned pregnancy. This finding was relatively higher compared to the report of studies done in the United States, Dilla University and Harar town where they reported 45%,11.1% and 33.3% cases of unplanned pregnancy respectively [13–15,5]. On the contrary, our finding was lower than the report of a study undertaken in Haramaya University, where the prevalence of unintended pregnancy was found to be 78.3%. This discrepancy in finding might be owing to differences in the number of study participants and study area, where our study was undertaken on college students, unlike the latter studies which took place in health facilities and post-abortion care centers.

Our study showed that 24.6% of the study participants had history of abortion experience. This finding was relatively lower as compared to a study done in the United States (42%), and it was higher than studies done in Ethiopia, Wolaita Sodo University and Mizan Tepi University where abortion experience was reported to be 2.8%, 6.5% and 1.8% respectively [9,14,16]. This discrepancy might be due to the difference in sample size and study period. According to this study, the prevalence of induced abortion was 18.6%. Our finding was relatively lower as compared to studies done in Wolaita Sodo University (96.9%), Arba Minch town (43.4%) and Hawassa town (66.7%), Amhara region (25%), Maichew town (93%) and Haramaya University where it was 66.7 percentwise [1,9,16,17]. On the other hand, our finding was higher than a study done in Hawassa University, northwest Ethiopia and Wachamo University, where the magnitude of induced abortion reported was 9.6%, 4.8 % and 5.9% respectively [2,3,10]. This difference might arise from variation in the study period and knowledge of study participants about abortion.

Our study revealed that year of study did have statistically significant association with the magnitude of induced abortion. This finding was supported by a study done in Wolaita Sodo University [9]. Furthermore, our study declared that department of study participants and history of condom use had significant association with magnitude of induced abortion. This finding was not in line with other studies [18–20]. A study done in Wolaita Sodo University showed that alcohol use had independent and statistically significant association with the likelihood of experiencing abortion unlike our study, which did not find significant association between alcohol use and prevalence of induced abortion.

Medical laboratory students, in our study, were 4.9 times more for the odds of having induced abortion practice than health extension students of the same batch. In addition, HIT students had 13.9(3.965- 49.045) times more odds of practicing induced abortion than health extension students of the same batch. This finding was contradictory with other studies done in Hawassa University and Northwest Ethiopia [20,21]. This discrepancy might be due to differences in the tendency of making abortion more pragmatic. Regarding year of study's association with induced abortion, 2nd year students were 10.8(1.205- 96.782) times more likely in practicing induced abortion than 3rd year students. In addition, our study revealed that students who did use condom had 3.25(1.319-7.9940) times more odds of having induced abortion than those who did not use. These findings of our study were contradictory with other studies' finding [10,22]. Students who reported use of alcohol had four times odds of practicing abortion than students who never used alcohol [AOR 3.95(1.63-11.11)]. Additionally, the odds of having abortion were again four times higher among fist year students as compared to second year and above students [AOR 3.98(1.50-10.53).

## LIMITATIONS OF THE STUDY

Despite invaluable efforts made for the successes of this research, it was not without some limitations as noted below. The limitation of the study was The sensitive nature of the study and social desirability bias made it difficult for knowing the accurate magnitude of induced abortion due to lack of

reliable data records and reluctant behavior of study participants to uncover their abortion related history.

## CONCLUSION

The prevalence of induced abortion was high in our study. Majority of the study participants had knowhow about the legality of abortion. Department, year of study and condom use were determinant factors having significant association with induced abortion.

## RECOMMENDATION

It is better if Federal Ministry of Health ensures access for different family planning methods of clients' choice to curb unwanted pregnancy, and thereby abortion. Due emphasis should be given for college students of reproductive age to scale up their knowledge on utilization of family planning methods and having protected sex through establishing health clubs at college level.

## ABBREVIATIONS

AAU- Addis Ababa University
DTU- Debre Tabor University
DU-Dilla University
EDHS –Ethiopia demographic health survey
MMR-Maternal mortality rate;
MTU-Mizan Tepi University
US- United States
WHO-World Health Organization
WSU-Wolaita Sodo University

## ETHICAL CLEARANCE

Ethical clearance from Debre Tabor University and permission letter from South Gondar Zone Health Bureau were obtained to undertake this study. Written informed consent was also taken from each study participant before data collection.

## COMPETING INTEREST

The authors report no conflicts of interest in this work.

## AVAILABILITY OF DATA AND MATERIALS

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

## AUTHORS' CONTRIBUTION

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted, and agree to be accountable for all aspects of the work.

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# TOTAL LAPAROSCOPIC HYSTERECTOMY: COMPARISON BETWEEN CONVENTIONAL AND RETROPERITONEAL TECHNIQUE

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## ABSTRACT

**AIM OF STUDY:** The study aims to know whether a retroperitoneal method of total laparoscopic hysterectomy is better than the conventional method of total laparoscopic hysterectomy. This was assessed by comparing both methods for intra-operative blood loss and urological complications.

**METHODOLOGY:** An observational study was done in patients planned for total laparoscopic hysterectomy (TLH) for benign pathologies who gave their consent to be included in the study. Patients were divided into two groups based on method of surgery. Group 1 included patients who underwent the conventional method of TLH while Group 2 included patients who underwent the retroperitoneal method of TLH. The groups were divided according to the doctor's efficiency in respective technique. The doctors who were comfortable in the conventional TLH were considered for Group 1 and authors conducted retroperitoneal TLH in Group 2. The data obtained from both groups were compared and then analyzed for the duration of surgery, blood loss and complications.

**RESULTS:** Out of 102 patients, 71 underwent the conventional method of TLH (group 1) and 31 underwent the retroperitoneal method of TLH (group 2). The mean duration of surgery was 132.0 ±39.3 minutes and 136.8 ±44.2 minutes in group 1 and group 2 respectively (p=0.643).The drop in haemoglobin level was 1.18 ±0.66g/dL and 1.11 ±0.45g/dL in group 1 and group 2 respectively (p=0.901). No significant complications like bladder, ureteric injury or excessive blood loss were observed in both the groups (p=1.000).

**CONCLUSION:** There was no statistically significant difference between the conventional method and retroperitoneal method of TLH in terms of blood loss and complications.

**KEYWORDS:** TLH, Retroperitoneal TLH, Complications of TLH, Uterine artery ligation in TLH, Ureteric injury

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## INTRODUCTION

Hysterectomy is one of the major surgeries in gynecology performed for benign or malignant conditions of the genital tract. Benign conditions account for 90% of hysterectomies [1,2] These benign conditions are abnormal uterine bleeding due to endometriosis, adenomyosis, and pelvic organ prolapsed [3]. The route of approach in hysterectomy can be vaginal, abdominal, laparoscopic or robotic surgery. The selection of the route of hysterectomy depends on the size of the uterus, associated pathology, need for other surgeries during operation, training obtained by the surgeon, supporting equipments of the operating theatre, need for emergency or planned surgery and preference of the patient4. In laparoscopic techniques, there are more complications compared to open surgery with respect to injury to bladder and ureter.[5] There is an increased risk of ureteric injury leading to prolonged operative morbidity and litigation against medical fraternity [6,7].

Total Laparoscopic Hysterectomy (TLH) is a method of removal of the uterus by separating it from its supports and closure of vaginal cuff through laparoscopic route8. It has been widely accepted due to its better cosmetic results, decreased intra-operative blood loss and decreased duration of hospital stay [9,10].

In the conventional method of TLH, the uterine artery is ligated at the level of isthmus, near its approach to the uterus. In cases of enlarged myoma or adenomyosis, uterine vessels are seen to be dilated, extensively tortuous and lie very close to the ureters [11–13]. These vessels may not be coagulated completely by conventional method, leading to operative complications like increased intra-operative bleeding. In an attempt to coagulate the uterine artery there is always an increased chance of ureteric injury and a need for conversion to laparotomy.

The retroperitoneal method of uterine artery ligation in TLH involves the creation of retroperitoneal space to identify the ureter, internal iliac artery and uterine artery. This is followed by ligation and division of the uterine artery at its origin from the anterior division of internal iliac artery on both the sides. As the uterine artery is ligated at the initial part of the surgery and ureter is constantly visualised during operation, even at the point of uterine artery crossing at isthmus level, hence operative bleeding and ureteric injury is said to be lesser as compared to the conventional method of total laparoscopic hysterectomy.

Very few studies have been published comparing the conventional method with the retroperitoneal method of uterine artery ligation. Thus, this prospective observational study was conducted to compare the conventional technique to retroperitoneal technique of uterine artery ligation in total laparoscopic hysterectomies with their outcomes.

## METHOD AND MATERIALS

A prospective observational study was conducted in the department of Obstetrics and Gynaecology, IMS and SUM Hospital, Bhubaneswar, Odisha, India with clearance from the Institutional Ethical Committee (Ref. No. DMR/IMS. SH/SOA/180271). Patients planned for total laparoscopic hysterectomy (TLH) for benign uterine and adnexal pathologies were recruited in this study. Patients with malignant uterine or adnexal diseases were excluded from the study. The total number of participants in the study was 102. The duration of the study was one year from July 2019 to June 2020. Data collection. After taking informed consent, patients planned to undergo TLH for benign uterine and adnexal pathology were included in the study. History, clinical examination, and investigations done were recorded. The method of uterine artery ligation, duration of surgery, intra-operative and postoperative complications were recorded. Patients were followed up for one month post-surgery. The cases were divided into two groups. Group 1 included patients with the conventional method of TLH and Group 2 included patients with the retroperitoneal method of TLH. The groups were divided according to the doctor's efficiency in the

technique. The doctors who were competent in the conventional TLH were considered in Group 1 and authors conducted retroperitoneal TLH considered in Group 2. After thorough counselling, patients willing for retroperitoneal dissection were recruited for Group 2.

**Operative procedure**

After being anesthetized, patients were placed in dorsal lithotomy position and the abdominal cavity was entered through the 10 mm supraumbilical port with the direct trocar insertion. Through this port, the peritoneal cavity was visualized. The peritoneal cavity was distended with carbon dioxide. Under the vision, three accessory ports (5 or 7 mm) were given (two ports in left and one port in right iliac fossa). The patient was then placed in a steep Trendelenburg position.

**Conventional method of total laparoscopic hysterectomy**

After the port placement as mentioned above, the round ligament was coagulated and cut after stretching the pedicles by moving the uterus to the contralateral side with the help of Sukhadia type of uterine manipulator inserted through the vagina. In the next step, the utero-ovarian pedicles were coagulated slightly away from the cornua of the uterus. The Utero-vesical fold of the peritoneum opened and the bladder was pushed down. This is followed by coagulation and division of uterine vessels on both sides at the level of isthmus as it approaches to the uterus as it would have been done in total abdominal hysterectomy. The transverse cervical ligaments and uterosacral ligaments were also coagulated and cut. It was followed by the opening of the vagina using monopolar cautery guided by the uterine manipulator. Usually bilateral prophylactic salpingectomy was followed as per institutional protocol. The ovaries were also removed as per requirement. The specimens were retrieved vaginally or by morcellation through the abdominal ports in case of an enlarged uterus.

**Retroperitoneal method of total laparoscopic hysterectomy**

Following visual examination of the abdominal cavity, the round ligament of one side was held about 2 cm medially from the pelvic side wall, coagulated and dissected. The entry of the carbon dioxide gas through this helped in creating a retroperitoneal space. The usual surgical step is the isolation of the ureter and uterine artery. Hence broad ligament was stretched and an incision in the broad ligament was made where it overlies the iliac vessels, thus allowing entry into the retroperitoneum. Then the incision was extended in a cranial direction parallel to the infundibulopelvic ligament over the external iliac artery so that the medial flap of the peritoneum contained the ureter. The identification of the ureter was confirmed by its glistening white colour, vessels over its surface, and peristaltic movement. The ureter was pushed medially. The uterine artery was identified at its origin from anterior division of internal iliac artery, coagulated and dissected. The above step was repeated on the opposite side. The anterior fold of the peritoneum was opened in the direction of the uterovesical fold of the peritoneum following which the bladder peritoneum was elevated and the bladder dissected and pushed down to reveal the anterior vaginal wall. The fallopian tube and ovarian ligament were coagulated and cut close to the uterus. Both the folds of parametria along with uterine vessels were coagulated and cut alongside the uterus and cervix. Uterosacral and transverse cervical ligaments were coagulated and cut on both sides. Throughout the procedure ureter was visualized during coagulations of pedicles. The rest of the procedures were same as the conventional method.

In both the methods, the vaginal vault was closed by using delayed absorbable suture material polyglactin by laparoscopic suturing technique (end suturing). Port site cannula removal was done under the vision and port sites were closed by mattress sutures.

**Statistical analysis**

Data collected from 102 cases was entered into IBM Statistics SPSS 24.0, SPSS South Asia Pvt. Ltd. The statistical analysis was done following the statistical procedure as given below. The distribution of patients into two groups was done according to

the method of TLH performed. This was tabulated using the frequency distribution procedure. Categorical variables like age group, chief complaint, co-morbidity, clinical diagnosis, surgery performed, complications, and final diagnosis in both the two groups were noted by using cross-tabulation procedure and their association was studied by using the Chi-square test of independence and Fisher's exact 'p' value. Non-parametric Mann-Whitney U 'p' value test was used for comparison of total duration of surgery, pre-operative and post-operative haemoglobin between two groups. The 'p' value < 0.05 has been taken as test of significance.

## RESULTS

A total of 102 cases were included in this study. Group 1 had 71 cases while Group 2 had 31 cases. These two groups were compared concerning the following aspects.

Table 1 shows the distribution of cases according to clinical diagnosis in both the groups. There was no statistically significant difference in clinical diagnosis between the two groups (p=0.679).

**Table 1: Distribution of clinical diagnosis**

| Clinical diagnosis | Method of Surgery | | | | Total | | Fisher's Exact 'p' value |
|---|---|---|---|---|---|---|---|
| | Conventional | | Retroperitoneal | | | | |
| | No. | % | No. | % | No. | % | |
| AUB-A* | 11 | 15.5 | 8 | 25.8 | 19 | 18.6 | |
| AUB-E** | 6 | 8.5 | 3 | 9.7 | 9 | 8.8 | |
| AUB-L*** | 33 | 46.5 | 12 | 38.7 | 45 | 44.1 | |
| AUB-M**** | 5 | 7 | 2 | 6.5 | 7 | 6.9 | |
| AUB-P***** | 0 | 0 | 1 | 3.2 | 1 | 1 | |
| Pelvic endometriosis | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| AUB-A* with right ovarian cyst | 2 | 2.8 | 0 | 0 | 2 | 2 | |
| Fibroid uterus with pyometra | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| AUB-L*** with ovarian endometriosis | 0 | 0 | 1 | 3.2 | 1 | 1 | |
| Unhealthy cervix | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Fibroid uterus and UTI# | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| AUB –A* and unhealthy cervix | 1 | 1.4 | 0 | 0 | 1 | 1 | 0.679 |
| Submucous fibroid | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Multiple fibroid and LUTS## | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Right ovarian mass | 0 | 0 | 1 | 3.2 | 1 | 1 | |
| BRCA### 1 mutation` | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Fibroid uterus | 0 | 0 | 1 | 3.2 | 1 | 1 | |
| AUB with chronic PID#### | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Bilateral ovarian endometriosis | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Adenomyosis | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Endometriosis | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| AUB-L*** with left ovarian endometriosis | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Elongated cervix | 0 | 0 | 1 | 3.2 | 1 | 1 | |
| Right ovarian endometriosis | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Fibroid uterus and left ovarian cyst | 0 | 0 | 1 | 3.2 | 1 | 1 | |
| Total | 71 | 100 | 31 | 100 | 102 | 100 | |

*Abnormal uterine bleeding-Adenomyosis **Abnormal uterine bleeding-Endometrial ***Abnormal uterine bleeding-Leiomyoma
****Abnormal uterine bleeding-Malignancy *****Abnormal uterine bleeding-Polyp #Urinary tract infection
## Lower urinary tract symptoms ### BRCA ####Pelvic inflammatory disease

Table 2 shows the distribution of cases according to co-morbidities in both groups. There was no statistically significant difference (p = 0.990) in co-morbidities between the two groups.

**Table 2: Distribution of co-morbidity between the two groups**

| Co-morbidity | Method of Surgery | | | | Total | | Fisher's Exact 'p' value |
|---|---|---|---|---|---|---|---|
| | Conventional | | Retroperitoneal | | | | |
| | No. | % | No. | % | No. | % | |
| – No co-morbidity | 46 | 64.8 | 22 | 71 | 68 | 66.7 | |
| Anaemia | 4 | 5.6 | 1 | 3.2 | 5 | 4.9 | |
| Hypertension | 4 | 5.6 | 1 | 3.2 | 5 | 4.9 | |
| Hypothyroidism | 3 | 4.2 | 1 | 3.2 | 4 | 3.9 | |
| Type2DM* | 6 | 8.5 | 5 | 16.1 | 11 | 10.8 | |
| Hypertension# and asthma | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Typei2DM*and Hypertension | 1 | 1.4 | 1 | 3.2 | 2 | 2 | 0.990 |
| Post DVR**status | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Typei2iDM*and bronchial asthma | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Typei2DM*Hypertension and sickle cell trait | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Type2DM*,Hypertension and hypothyroidism | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Hypothyroidism and Hypertension 1 | 1.4 | 0 | 0 | 1 | 1 | | |
| Anaemia, paradoxical septal movement and type 2DM* | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| TOTAL | 71 | 100 | 31 | 100 | 102 | 100 | |

*Diabetes Mellitus; ** Double valve replacement;

Table 3 shows the distribution of various surgeries performed between the two groups. There is no statistically significant difference (p=0.263) between the two groups concerning the surgery performed on patients.

**Table 3 Distribution of the surgeries performed**

| Surgery Performed | Method of Surgery | | | | Total | | Fisher's Exact 'p' value |
|---|---|---|---|---|---|---|---|
| | Conventional | | Retroperitoneal | | | | |
| | No. | % | No. | % | No. | % | |
| TLH+BS* | 46 | 64.8 | 16 | 51.6 | 62 | 60.8 | |
| TLH+BSO** | 19 | 26.8 | 9 | 29 | 28 | 27.5 | |
| TLH+RS+LSO*** | 4 | 5.6 | 2 | 6.5 | 6 | 5.9 | 0.263 |
| TLH+LS+RSO# | 2 | 2.8 | 2 | 6.5 | 4 | 3.9 | |
| TLH+RS## | 0 | 0 | 1 | 3.2 | 1 | 1 | |
| TLH+BSO+ADHESIOLYSIS | 0 | 0 | 1 | 3.2 | 1 | 1 | |
| TOTAL | 71 | 100 | 31 | 100 | 102 | 100 | |

* Total laparoscopic hysterectomy with bilateral salpingectomy
**Total laparoscopic hysterectomy with bilateral salpingo-oophorectomy
***Total laparoscopic hysterectomy with right salpingectomy and left salpingo-oophorectomy
#Total laparoscopic hysterectomy with left salpingectomy and right salpingo-oophorectomy
##Total laparoscopic hysterectomy with right salpingectomy

Table 4 shows comparison of the total duration of surgery between the two groups. There was no statistically significant difference in both groups (p=0.643).

**Table 4: Comparison of Total duration of surgery (in minutes) between the two methods**

| Descriptive statistics | Method of Surgery | |
|---|---|---|
| | Conventional (n=71) | Retroperitoneal (n=31) |
| Mean | 132.0 | 136.8 |
| Standard deviation(SD) | 39.3 | 44.2 |
| Q1 (1st Quartile) | 105 | 110 |
| Q2 (Median) | 120 | 120 |
| Q3 (3rd Quartile) | 155 | 170 |
| Mann-Whitney U 'p' value | 0.643 | |

Table 5 represents comparison of preoperative haemoglobin (Hb) and postoperative hemoglobin between the two groups. There was no significant difference in the pre-operative Hb and post-operative Hb between the two groups.

**Table 5: Comparison of pre-operative and post-operative Hb* (g/dL)**

| Hb* (g/dL) | Method of surgery | | | | | | Mann-Whitney U 'p' value |
|---|---|---|---|---|---|---|---|
| | Conventional (n=71) | | | Retroperitoneal (n=31) | | | |
| | Mean | SD | Median (IQR) | Mean | SD | Median (IQR) | |
| Pre-operative | 11.0 | 1.4 | 10.8(9.9,11.9) | 11.0 | 1.3 | 11.1(10.1,12.0) | 0.861 |
| Post-operative | 9.8 | 1.3 | 9.7(8.7,10.8) | 9.9 | 1.4 | 9.6(8.9,11.3) | 0.634 |

***Haemoglobin**

Table 6 a represents comparison of fall in Hb levels between the two groups. There was no significant difference in mean falls in Hb levels between the two methods (p=0.901).

**Table 6 Comparison of fall in Haemoglobin (Hb) levels (g/dL) between the two groups**

| Fall in Hb levels (g/dL) | Method of Surgery | |
|---|---|---|
| | Conventional (n=71) | Retroperitoneal (n=31) |
| Mean | 1.18 | 1.11 |
| Standard deviation(SD) | 0.66 | 0.45 |
| Q1 (1st Quartile) | 0.80 | 0.80 |
| Q2 (Median) | 1.10 | 1.00 |
| Q3 (3rd Quartile) | 1.30 | 1.30 |
| Mann-Whitney U 'p' value | 0.901 | |

Table 7 represents the association of complications with the method of surgery .A single case of post-operative uretero-vaginal fistula due to ureteric injury and one case of post-surgical bleeding p/v were observed in conventional group, whereas no such complications were observed in retroperitoneal group which is not statistically significant(p=1.000).

**Table 7 Association of complications with the method of surgery**

| Complication | Method of Surgery | | | | Total | | Fisher's Exact p' value |
|---|---|---|---|---|---|---|---|
| | Conventional(n=71) | | Retroperitoneal(n=31) | | ' | | |
| | N | % | N | % | N | % | |
| No complication | 69 | 97.2 | 31 | 100 | 100 | 98 | 1.000 |
| Post-operative uretero-vaginal fistula | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Post-surgical bleeding p/v | 1 | 1.4 | 0 | 0 | 1 | 1 | |
| Total | 71 | 100 | 31 | 100 | 102 | 100 | |

## DISCUSSION

A total of 102 cases were included in this study. The women included in this study were compared concerning age, presenting complaints, and clinical diagnosis. No statistically significant difference was seen between the two groups. A wide range of clinical diagnoses was seen among the patients. In patients with anaemia, blood transfusion was done pre-operatively to correct the anemia and hemoglobin levels were brought up to 10 g/dl and above. The study group was divided into two groups named Goup 1 (conventional method) and Group 2 (retroperitoneal method). The distribution of co-morbidities was similar in both groups (p=0.990). As shown in Table 3, type of surgeries performed in both groups are near comparable (p =0.263)

Out of the total cases in group 1, most of them 69 (97.2%) did not encounter any complications. Only one case of ureteric injury occurred in the conventional method of uterine artery ligation in TLH. The patient presented on postoperative day 8 with the complaint of continuous vaginal discharge and a diagnosis of right side ureterovaginal fistula was made with the help of CT- KUB scan. The patient underwent ureteric re-implantation and double J stent placement. One case of postoperative vault bleeding was observed in conventional group which was probably due to the increased INR value as she was on warfarin prophylaxis for post double valve replacement (DVR) surgery. The patient was transfused with 4 units of fresh frozen plasma and re-exploration was done to seal the bleeding site from the vaginal vault. The patient's postoperative period was uneventful and discharged on day 6 of the postoperative day. No complications were encountered in the group where retroperitoneal ligation of the uterine artery was done in TLH. The differences between the two groups were not statistically significant concerning fall in hemoglobin level, complications and duration of surgery.

Sinha R et al.14compared the two procedures of TLH where in one group, TLH was started with ligation of both the uterine arteries (ascending branch) at isthmus followed by division of corneal structures (group A) while in another group, division of corneal structures was done first followed by uterine pedicles and utero-sacral ligaments (group B). This study revealed that there was a statistically significant decrease in blood loss and duration of surgery when uterine artery ligation was done before the division of corneal structure. No major complications occurred during this study.

A study by Poojari V G et al.15 had compared conventional TLH and TLH with prior uterine artery ligation (ascending branch of the uterine artery near isthmus was ligated before the division of corneal structures in this study). There was a statistically significant reduced blood loss and duration of surgery as well as the complications in the TLH group with prior uterine artery ligation as compared to conventional TLH .

The blood loss during TLH was calculated by suction apparatus (in ml) in these two studies while in our study we used the fall in hemoglobin levels on the 2nd postoperative day as a method to indirectly evaluate the total blood loss that might have occurred during the surgery. When the amount of blood loss is calculated only by using the suction apparatus, the total amount of blood loss incurred by the patient might not be reflected well by it. The fall in hemoglobin would be a better indicator as it can be used to decide whether there is any need for post-operative blood transfusion.

In our study one case of ureteric injury was seen in the conventional method of TLH. During conventional TLH, the risk of ureteric injury is increased because the ureter passes very close to the uterus in large uterine tumors. In distorted anatomy, the difficulty is encountered during uterine artery coagulation. In retroperitoneal dissection, ureters are constantly visualized during the surgery and prior uterine artery ligation causes transient uterine ischemia which leads to decreased blood loss during surgery. Hence we believe that the main step in hysterectomy is securing the uterine vascular pedicle and prevention of ureteric injury

by constant visualization of the ureter through it entire course. Both of these steps are achieved in the retroperitoneal method of TLH.

## LIMITATIONS

The sample size of the study is not large enough to derive the conclusion of whether the conventional or retroperitoneal method of uterine artery ligation during TLH is preferable over the other. A lesser number of TLH was done with the retroperitoneal method of uterine artery ligation as compared to the conventional method during the study period. There was no randomization of the patients into the above two groups because this study was only an observational study. Multiple surgeons were included in the study and could have affected the results of the study group due to varied surgical techniques, experience and expertise.

## CONCLUSION

This study showed no significant difference between the two techniques concerning mean fall in hemoglobin, mean duration of surgery and complications in total laparoscopic hysterectomy. No complications were noted in the group of the retroperitoneal method of uterine artery ligation. However one case of ureteric injury was observed in conventional TLH group at the site of bladder insertion. It was a thermal burn and occurred during coagulation of uterine artery.. More studies in this area would help us in a better understanding of the techniques and their complications.

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## CONFLICT OF INTEREST

The authors have no conflict of interest.

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# CASE REPORT: VAGINAL BLEEDING IN A CHILD DUE TO VAGINAL LEECH INFESTATION

Demisew Amenu, MD[1], Habtamu Beyene, MD[1]

## ABSTRACT

**BACKGROUND:** Vaginal bleeding during childhood is always abnormal, rare and warrants diagnostic evaluation. Leech infestation following exposure to leech infected water is a rare cause of vaginal bleeding. The definitive diagnosis relies on direct visualization of the leech.

**CASE DETAILS:** A 3 years old young girl presented with vaginal bleeding of 1 weeks duration on 28/10/2016 to Jimma university Hospital Medical Center, Ethiopia .On examination, she had normal vital signs. Her vulva was blood soaked. Following instillation of saline to the vagina, a dark moving worm in vaginal introits was found. The leech was removed from the vagina with help of suction tube and she was discharged with good condition on the second day of leech removal.

**CONCLUSION:** Instillation of saline to vagina is used for treatment and diagnosis in children with intact hymen.

**KEYWORDS:** Vaginal leech infestation, childhood vaginal bleeding.

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## INTRODUCTION

Leeches are blood sucking worms with segmented bodies. They are invertebrates of phylum Annelida and class Hirudinea. A leech varies in size from about 5 mm to nearly 45 cm long. Leeches are primarily found in fresh water lakes, ponds, or rivers. They have a sucker at both ends. The anterior sucker, which is found at the head, creates the bite wound and is responsible for feeding. The other sucker is located at its tail, used for attachment to the host while feeding. To feed, a leech first attaches itself to the host using the suckers. One of these suckers surrounds the leech's mouth, which contains three sets of jaws that bite into the host's flesh, making a Y-shaped incision. As the leech begins to feed, its saliva releases chemicals that dilate blood vessels, thin the blood, and deaden the pain of the bite[1,3].

There are reported leech infestations in various human body sites such as the nose, pharynx, larynx, esophagus, rectum and bladder.They attach to their hosts and remain there. They commonly affect children and people who live in unhygienic environments. Leeches possess different chemicals such as proteolytic inhibitors (e.g. hirudin, anesthetic, vasodilators and hyaluronidase). These chemicals play great roles in pathogenesis of leech infestation [1, 2].

The most common symptom of leech infestation is continuous bleeding from sites of attachment. It may cause serious complications occur such as lethal dyspnoea, hemoptysis, epistaxis, hematemesis , anemia or even death [2,3,4].

The prevalence of childhood vaginal bleeding due to leech infestation is rare. The differential diagnosis of childhood vaginal bleeding includes trauma, tumor, neonatal bleeding, exogenous estrogen, precocious puberty, urethral prolapse, genital warts, lichen sclerosus, infectious vaginitis and foreign body [2,5].

## CASE PRESENTATION

A 3 year old female child presented with vaginal bleeding of 1 week duration to Jimma University Hospital medical center. The bleeding was bright red, moderate, with clots and painless. She had no bleeding from other body sites. She had history of contact with river water. She was referred to our hospital from a nearby hospital. On examination, she was healthy looking with normal vital signs. On inspection, the vulva and thighs were soaked with blood and there was also minimal vaginal bleeding. Speculum examination was not done because of intact hymen and no pediatrics speculum in hospital. Following irrigation of the vulva, a dark moving worm in vaginal os was seen.

Laboratory findings were: hemoglobin = 11g/dl, platelet count = 278,000 cells/microliter, normal leukocyte count and no parasite on stool examination, PT=19.3sec, PTT=29.4sec, abdomino-pelvic ultrasound finding was normal.

With the diagnosis abnormal uterine bleeding secondary to vaginal leech infestation, the patient was admitted to the gynecology ward. After preparation on the next day, under ketamine anesthesia in the OR, she was put in lithotomy position. Foley catheter number 14 was inserted into vagina and irrigated with 500ml normal saline and 5ml of lemon fluid. After 5 minutes of irrigation, the leech detached and start to move in vaginal introitus. Due to intact hymen and narrow vagina it was not possible to remove the leech with sponge forceps or artery forceps. The leech was removed by suctioning using a small suction tube (Figure 1,2,3). The hymen was kept intact and the vaginal bleeding stopped then after. She was discharged in good condition on the 2nd post procedure day with advice to avoid contact with contaminated water, and to use clean water for drinking, swimming and for washing.

**Figure 1: Leech removal using suction tube, Jimma University Hospital Medical Center**

**Figure3: Removed leech in bottle containing water, 2 days after removal, at Jimma university medical center.**

**Figure 2: Leech removed from vagina of 3 years old female**

## DISCUSSION

People who are living in rural areas use river and standing water for drinking, bathing and/or douching. This predisposes them for leech infestation which can be prevented by improving safe water access [1,2,3,4].

Leech infestation presents with different symptoms based on sites of attachment. Continuous bleeding from site of attachment is the usual symptom. Due to the presence of anticoagulants in the saliva of the leech such as hirudin, bleeding may persist over a longer period of time. Bites may become infected or ulcerated [1,2,3]. After the leeches drop off, bleeding may continue as the result of the action of hirudin. Even though a leech sucks a few milliliters of blood before it detaches itself from the host, the bite wound may continuously bleed for the next 10 hours to 7 days due to the presence of an anti-coagulant substance, hirudin, in its saliva, which is a potent inhibitor for thrombin. Normally thrombin activates the conversion of fibrin from fibrinogen and promotes platelet aggregation. Hirudin therefore will reduce blood clot formation by inhibiting the action of thrombin. There are also other substances that are present in the leech saliva such as local vasodilator agent (histamine) and hyaluronidase[1]. There are many cases reported about internal attachment of leeches in different areas of human body such in pharynx, larynx, vagina, bronchi, nose and rectum [6,7,8,9].

Childhood vaginal bleeding is a serious gynecologic problem which requires rapid diagnostic and therapeutic measures. Its approach requires meticulous history and physical examinations [1,5,8]. In adult, simple speculum examination can confirm the diagnosis [2,3,4] but in childhood age with intact hymen and in health facility where nasal speculum, pederson speculum and pediatrics speculum are not available, both diagnosing and managing leech infestation in children is challenging[1,8]. In parous women, simple speculum examination without anesthesia and removal of a leech by surgical forceps from vagina is a management option [2, 3, and 4].

Our case was a very young child with intact hymen and in a family who gives high value for virginity with absence of speculum, which created a diagnosing and managing challenge. As in our case, by using history as point of entry, under ketamine anesthesia, flashing the vagina with normal saline[500ml] through a small catheter caused irritation and dislodged the parasite from attached site which helped us to diagnose presence of leech while moving in the vaginal introits in and out, but due to fast movement of leech and intact hymen, removal of a leech by surgical forceps was not possible. Once the parasite dislodged from attached site, as in our case, suction with small diameter suction tube can safely remove leech from the vagina. The other management options for leech bites are leech removal using salt, salt water, tobacco water or even vinegar. These agents will cause the leech to vomit and therefore detach. The leech should not be forcibly removed because its jaws may remain in the wound, causing continuous bleeding and infection [2, 3].

The early presentation of the patient and prompt diagnosis of the cause of the vaginal bleeding, has prevented possible life-threatening conditions from failure or delay in making the diagnosis and management; flashing the vagina with normal saline under ketamine anesthesia is helpful for diagnosing and management especially in area where pediatrics speculum is not available and avoiding the hymen is relevant. Even though removal of a leech by surgical forceps from vagina under direct vision with the help of speculum is a management option, suction with small diameter suction tube can be safely remove leech without using speculum and no injury to hymen.

## ETHICAL APPROVAL

Official letter obtained from Jimma University (JU) Obstetrics/gynecology department office and Verbal and written consent was obtained from the patient's family.

## CONFLICT OF INTERESTS

The authors declare that there is no conflict of interests regarding the publication of this paper.

## AUTHOR CONTRIBUTIONS

DA and FA: Substantial contributions as ward consultant senior, acquisition of data, drafting the article, revising the article critically for important intellectual content and final approval of the version to be published.

HB and AS: Substantial contributions in the diagnosis, managing, to design, acquisition of data, drafting the article, revising it critically for important intellectual content, final approval of the version to be published.

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In order to fulfill uniform requirements for the journal, the following instructions have to be followed by authors: The manuscript should be a total of 3000 to 4000 words. Manuscript layout: Manuscripts should be written in English and typed double-spaced leaving generous margins. Pages should be consecutively numbered. The body of the manuscript should be organized under appropriate headings and sub-headings such as introduction, methods, results, discussion, acknowledgements, and references.

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