ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

SCHOOL OF MEDICINE

DEPARTMENT OF ANATOMY

MAGNITUDE OF ECTOPIC PREGNANCY, MANAGEMENT METHODS, AND ITS ASSOCIATED FACTORS AMONG PREGNANT WOMEN ATTENDING AMBO UNIVERSITY REFERRAL HOSPITAL IN OROMIA REGIONAL STATE, ETHIOPIA: A SEVEN YEARS RETROSPECTIVE INSTITUTIONAL BASED CROSS-SECTIONAL STUDY

By: Nigussie Tesfaye (B.Sc. in Public Health)

Advisor: Prof. Mekbeb Afework (Professor of Histology, AAU).

Co-advisor: Dr. Motuma Gutu (Obstetrician and Gynecologist, AURH)

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A thesis submitted to Addis Ababa University College of Health Science Department of Anatomy in partial fulfillment of the requirement for a master's science degree in Anatomy.

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Title of the research	The magnitude of ectopic pregnancy, management methods and its associated factors among pregnant women attending Ambo University Referral Hospital in Oromia Regional state, Ethiopia.
Study period	February 1 – April 20, 2024
Study design	Institutional-based retrospective cross-sectional study
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DECLARATIONS OF PRINCIPAL INVESTIGATOR

The undersigned, Nigussie Tesfaye Gizaw / IDNO: GSR/4425/14, certifies that this thesis which is entitled "The Magnitude of Ectopic Pregnancy, Management Methods and its Associated Factors among Pregnant Women attending Ambo University Referral Hospital in Oromia Regional State, Ethiopia" is entirely my original work with no submissions, either partial or complete, from any other author. As the signatory to this agreement, I undertake full responsibility for the study project's ethical and scientific conduct. My work, which I submitted in partial fulfillment of the requirement for the Master of Science in Human Anatomy, complied with University regulations and met the accepted standards in terms of originality and quality. I promise to inform you that this postgraduate degree thesis is entirely mine.

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ABBREVIATION AND ACRONYMS

AAU- Addis Ababa University

ANC- Antenatal care

ART-Assisted reproductive technology

AURH-Ambo University Referral Hospital

CHS- College of Health Science

DES- Diethylstilbestrol

EP-Ectopic pregnancy

HMIS –Health management information system.

IUCD- Intrauterine contraceptive device

MCH- Maternal and child health

MOH-Ministry of health

OC- Oral contraceptive

PID - Pelvic inflammatory disease.

SD – Standard deviation

STIs-Sexual transmitted illness

WKs- weeks

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ABSTRACT

Background: Ectopic pregnancy is the implantation of a blastocyst outside of the endometrial lining of the uterus. There are various forms of ectopic pregnancy, such as ovarian, abdominal, and tubal pregnancy. Nearly 97.7% of all ectopic gestations occur in the fallopian tube, which is the most common location for ectopic pregnancy. Almost 80% of tubal pregnancy occurs in the ampulla, followed by the isthmus (12%). Ectopic pregnancy is diagnosed with the classic triad of amenorrhea, abdominal pain, vaginal bleeding, and a positive pregnancy test.

Objective: This study aimed to assess the magnitude of ectopic pregnancy, its management methods, and its associated factors among pregnant women attending Ambo University referral hospital in Oromia Region, Ethiopia, in 2024.

Methods: A seven-year retrospective cross-sectional study, from February 2018 to April 2024, was conducted. Data about all pregnant mothers who were admitted and managed for ectopic pregnancy was extracted from the medical records of patients and the operation book by a trained data collector through Kobo Toolbox electronic data collection software. The collected data was checked for completeness and exported into SPSS version 26 software for data analysis. Descriptive statistics was employed for data summarizing, and bivariate and multivariate logistic regression analysis was used to identify the independent effect of the predictor variable on the outcome variable. The study was conducted at the Ambo University Referral Hospital, which is located in Ambo town, Ethiopia.

Result*:* From February 2018 to April 2024, there were 17,687 total pregnancies, 6,249 gynecologic admissions, and 182 cases of ectopic pregnancies in Ambo University Referral Hospital. Of these, 173 cases of ectopic pregnancy were fit for data analysis. Exclusion criteria excluded the remaining. The magnitude of ectopic pregnancy was 0.98% among the total pregnancies and accounted for 2.77% of all gynecological admissions during the study period. Most of the patients, 81 (46.8%), were within the 25–29 age group, with a mean age of 27.16±SD 4.77 years. Mothers who had a previous history of abortion, a history of pelvic inflammatory disease, a history of ectopic pregnancy, and a history of tubal surgery showed a statistical association with ectopic pregnancy. The majority of the patients were married, 98 (56.6%), and urban residents, 121 (69.9%). In this study, abdominal pain 77 (44.5%) was the most common presenting chief complaint, followed by abnormal vaginal bleeding 53 (30.6%), and the majority of ectopic pregnancies occurred on the right side of the fallopian tube 144 (83.24%). Of the majority of ectopic pregnancies, 159 (61.3%) were tubal ampullary ectopic pregnancies, and 160 (92.49%) of them ruptured. In this study, salpingectomy was the most predominant treatment of choice for ectopic pregnancy, which was a treatment option for 133 (76.9%) cases. The majority of the 149 (86.1%) patients presented at an estimated gestational age of < 7 weeks with a mean gestation of 7.2 SD ±0.46,123 (71.1%) presented with hemoglobin levels > 10 g/dl, and an estimated intraoperative blood loss was < 500 ml in 99 (57.2%) cases in the present study. A urine pregnancy test was done for all women in this study, and all of them tested positive. The majority of the cases, 94 (54.3%) were diagnosed by clinical, culdocentesis, and ultrasound scans.

Conclusion and recommendation: The major risk factors identified in this study were previous abortion, pelvic inflammatory disease, a previous history of ectopic pregnancy, and previous tubal surgery. The magnitude of the ectopic pregnancy in this study was 0.98%, which is similar to the global range. The majority of ectopic pregnancies occurred on the right side of the fallopian tube 144 (83.24%) and ruptured 160 (92.49%). This study's most frequent postoperative complications were anemia 33 (19.1%) and postoperative fever 15 (6.7%). A high index of clinical suspicion is significant for the early diagnosis of ectopic pregnancy. Further research is needed to assess why ectopic pregnancy is most dominant in the right fallopian tube**.**

Keywords: ectopic pregnancy, magnitude, and risk factors.

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the study

Ectopic pregnancy (EP) is a gynecological emergency in which the blastocyst implants outside the endometrial lining of the uterus. There are two types of ectopic pregnancies: tubal and non-tubal ectopic pregnancy. Non-tubal pregnancies occur when oocytes are fertilized outside of the fallopian tube or when they are fertilized inside the tube but protrude into the peritoneum. These abnormal sites of implantation include ovarian pregnancy, abdominal pregnancy, and tubal pregnancy (1). Nearly 97.7% of all ectopic gestations occur in the fallopian tube, which is the most common location for ectopic pregnancy, also known as tubal pregnancy. Other common sites include the abdominal cavity (1.4%), the ovaries (0.02%), and the area around the internal cervical Os, which frequently results in placenta previa (0.2%). Approximately 80% of tubal pregnancy takes place in the ampulla, with the isthmus (12%), fimbria (5%), and narrow part of the uterine tube (interstitial implantation) [0.2%] (1,2). Ectopic pregnancy is a global pregnancy-related issue that is most frequently associated with life-threatening gynecological cases and medical emergencies requiring immediate attention when there are ruptures. Initially, ectopic pregnancy is asymptomatic; nearly all mothers arrive after experiencing hemodynamic problem symptoms.

Ectopic pregnancy is a significant gynecological practice with high rates of morbidity and death associated with it. Its consequences are most common in low- and middle-income (developing) nations. It accounts for 10% to 15% of all maternal deaths and is one of the main causes of maternal mortality in the first trimester (3). Over the past three decades, the incidence of EP has increased threefold in the majority of industrialized countries. The annual incidence rate varies between 100 and 175 per 100,000 women of reproductive age (4). Ectopic pregnancy is diagnosed with the classic triad of amenorrhea, abdominal pain, vaginal bleeding, and a positive pregnancy test. However, only 50% of patients exhibit the usual symptoms at presentations (5). A four-year cross-sectional study carried out in South Africa found that 81.1% of the recorded symptoms were associated with abdominal discomfort, which was the patients' primary complaint. Additionally, more than one-third of the patients showed signs of shock upon hospital visit (6).

Abdominal pain, vaginal bleeding, and delayed menstruations were frequent symptoms at presentations, and most patients (61%) presented with ruptured ectopic pregnancy (7). The precise cause of ectopic pregnancy remains unknown. Women are susceptible to EP, though, for several reasons. Among these are: Major risk factors and causes of pelvic infection have been discovered, including the use of contemporary contraceptives, appendicitis, puerperal sepsis, abortion status or post-abortion sepsis, and pelvic inflammatory disease (PID). (7,8). Ectopic pregnancy is more likely if the uterine tubes are malformed or damaged from prior surgery or infection, tumors, or, in rare cases, birth defects. The risk of an ectopic pregnancy can rise with uterine tube reconstruction surgery, which is performed to improve a woman's chances of becoming pregnant. (9,10).

There is a higher chance of infertility and tubal ectopic pregnancy (EP) among women who have experienced tubal ectopic pregnancy (EP). The primary function of the uterine tube is to offer the best environment for gametes to flow through, mature, and establish a pregnancy. Numerous investigations have demonstrated that abnormal zygote transport and a modification of the tubal environment, which permits abnormal implantation, are the two main causes of tubal EP (11). The use of progesterone-only pills, exposure to diethylstilbestrol, STIs, maternal age above thirty-five, chromosomal abnormalities in the zygote, history of ectopic pregnancy, artificial zygote transfer, and assisted reproductive technologies (ART) are additional risk factors (12). Ectopic pregnancy is more likely when there is an underlying tubal issue. Because ectopic pregnancy is frequently difficult to identify and might present late with a violent rupture, non-tubal ectopic pregnancy is associated with higher mortality and morbidity than tubal ectopic pregnancy. Abdominal or transvaginal ultrasound is an important tool in the diagnosis of ectopic pregnancy (10,13).

1.2 Statement of the Problem

Ectopic pregnancy symptoms can range from intense abdominal pain to no symptoms at all, and complications might also develop. Massive bleeding, hypovolemic shock, anemia, and the mother's death are the consequences of the ruptured ectopic pregnancy (14). EP is the principal cause of maternal mortality and morbidity worldwide (15). A five-year retrospective study (2009-2013) at the University of Benin found that 89% of all pregnant women with hemodynamic compromise and 88% of cases of tubal rupture have ruptured EP (16). Worldwide, approximately 1-2% of all naturally conceived pregnancies result in ectopic pregnancy (3). Studies in Africa also revealed a similar incidence of 1-2 % of ectopic pregnancies (17). A three-year (20013-20015) retrospective study of all gynecological admissions in referral hospitals in the Volta Region of Ghana reported an ectopic prevalence of 2.1% (18).

Ectopic pregnancy accounted for 8.7% of maternal mortality and ranked among the top five leading causes of maternal death in Ghana (19). In Ethiopia, the magnitude of ectopic pregnancy among total deliveries was 0.82% (7). Ectopic pregnancy has paramount short-term and long-term impacts on women’s reproductive health and audible issues for the community. The short-term complications of ectopic pregnancy are massive bleeding, shock, and adverse psycho-emotional effects on the mother. The long-term complication of EP is that it affects the subsequent fertility of women (20).

Ectopic pregnancy also gives rise to financial burdens, both on patients and healthcare institutions, especially in developing countries (14). The likelihood of a subsequent intrauterine pregnancy in patients with prior ectopic pregnancies ranges from 50 to 80%, with the remaining patients likely to be infertile. This condition primarily affects young women who have low parity and wish to become pregnant in the future.

Worldwide, within the past three decades, the rate of ectopic pregnancy has increased (20,21). Ectopic pregnancy remains a leading cause of maternal mortality and morbidity in the first trimester of pregnancy in developing countries (3,22,23).

An ectopic pregnancy occurs in all races, in all countries, and at any socio-economic level of women during the reproductive years.

Ectopic pregnancy is an emergency, although it is an uncommon case with no apparent trend of hospitalizations. It takes more time, resources, and effort to ascertain the prevalence and related risk factors of EP using primary data. Hence, a retrospective study was done. In this particular area of study, there is a lack of research describing the prevalence, management methods, and contributing factors of ectopic pregnancy in the region. Therefore, this research attempted to fill these gaps in this area. The study area differs from other areas in terms of its cultural, religious, socio-demographic, sexual behavior, beliefs, and use of contraception.

The purpose of this study was to determine the risk factors, the magnitude of ectopic pregnancy, and the management methods of ectopic pregnancy among pregnant patients who visit Ambo University referral hospitals in Oromia Regional State, Ethiopia.

1.3 Significance of Study

The importance of this study was to determine the possible risk factors for ectopic pregnancy, the management methods, and the magnitude of the ectopic pregnancy in the study setting. The results will also help reduce the morbidity and mortality associated with ectopic pregnancies in patients.

Ectopic pregnancy is a problem in this society as well as one that affects the entire world and the country. Since this hospital has not conducted the same research since its founding, the study's findings can provide pertinent guidance for it.

Moreover, the results of this study will assist women who are of reproductive age, healthcare professionals, researchers, the Ministry of Health (MOH), and any other organization in developing suitable interventions to gather and establish vital data for a more in-depth investigation. Additionally, recommendations derived from the findings of concern will also be a valuable resource in addressing the issue.

2. LITERATURE REVIEW

2.1. Overview of ectopic pregnancy

Ectopic pregnancy is a prevalent obstetric condition worldwide. According to the risk factors prevalent within the area, the incidence of EP varies among countries. In early pregnancy, it is a major source of morbidity and mortality. Over the previous three decades, the rate of ectopic pregnancy has increased globally. According to research, during the past 25 years, the incidence of ectopic pregnancy has increased six times in America (24,25). An increase in the disease's risk factors may be the cause of the apparent rise in ectopic pregnancies. The rate of death has declined in developed nations despite the ongoing rise in the occurrence of ectopic pregnancy, primarily as a result of advancements in early detection and diagnosis before tubal rupture (15).

In developed countries, ectopic pregnancy prevalence ranges from 2% in the general population to 20% in individuals with a history of tubal surgery, ectopic pregnancy in the past, or sexually transmitted infections (STIs). In 1990, a review showed an increase in the incidence of EP from the 1960s up to the middle of the 1980s. In this review, the highest EP incidence rates were reported in African countries (between 0.5 and 2.3% of live births). In contrast, low incidence rates were observed in Asia and the Middle East over the same period: 0.4% of live births between 1964 and 1973 in India and about 0.6% of live births between 1976 and 1982 in Jordan (26,27).

In the 11 years (2000–2010), a retrospective descriptive study at hospitals in Hamadan province, Iran, showed the overall incidence of ectopic pregnancy was estimated to be 2.6 per 1000 recorded pregnancies. A retrospective study was conducted at Mullana, Ambala, India, from January 1st, 2014, to December 31st, 2015, and reported that the incidence of ectopic pregnancy in the institute was 0.97%, mainly affecting young multiparous women (28,29). According to clinical research on ectopic pregnancies in Bangladesh, the ampulla (53.2%), isthmus (21.3%), and fimbriae (12.7%) have the highest rates of ectopic pregnancy (21). A retrospective study was carried out to examine all cases of EP registered in the medical files of two referral maternity units at the Donka and Ignace Deen University Hospitals in Guinea between 1995 and 1999. The study revealed that the incidence of EP at the two maternity units increased from 0.41% to 1.5% of annual deliveries over this period.

The prevalence of ectopic pregnancy accounted for 4.26% of all pregnancies and 5.55% of all gynecologic hospital admissions, according to a 3-year retrospective study conducted in Nigeria (30,31).

According to a descriptive exploratory research design, the prevalence of ectopic pregnancy in Egypt was found to be 0.52%, 0.62%, and 0.72% in 2018, 2019, and 2020, respectively, along with the related risk factors. The study, which was conducted in the northern Ethiopian Tigray Regional State's Aksum University Comprehensive and Specialized Hospitals and Saint Marries General Hospitals, found that the overall prevalence of ectopic pregnancy was 0.52% of all deliveries, or 1:93 deliveries (32,33).

In another study, the prevalence of ectopic pregnancies among all pregnancies and gynecological procedures at Adigrat Hospital in the Tigray Region of Northern Ethiopia was found to be 0.82% and 3.74%, respectively. The ampulla, isthmic, and fimbria account for roughly 57.1%, 9.1%, and 16.9% of cases, respectively (7).

Ectopic pregnancies can be caused by several etiologic factors, such as smoking, intrauterine devices (IUDs), oral contraceptives (OC) that solely contain progestin, smoking, history of previous ectopic pregnancy, history of abdominal or tubal surgery, and smoking (13). Apart from this, other risk factors include the women's marital status and prior history of PID (34).

2.2. Risk factors of Ectopic Pregnancy

2.2.1. Sociodemographic Factors

According to a retrospective cohort study conducted at King Khalid Hospital in Majmaah, Saudi Arabia, the majority of study participants (62.8%) were between the ages of 21 and 30. The minority of participants (2.3%) were 40 years of age or older, which is consistent with most studies because of the general fertility decrease with advanced age. Additionally, it states that 67.4% of the patients were primigravidae, with 8.5% representing gravida 2, 3, and 4, and 7% representing gravida 6 (35).

According to a retrospective study carried out in India, younger individuals were disproportionately affected by ectopic pregnancy. The incidence of ectopic pregnancy was observed to be higher in multiparous women (61.1%) compared to primigravidae (19.4%) (29). A retrospective case-control research conducted in India found that poor socioeconomic status and age above 30 were the two main risk factors for ectopic pregnancy (36). The overall incidence of ectopic pregnancy was found to be 1.89% in a five-year retrospective and descriptive study

conducted at the University Hospital of Benin, Benin, with 88.69% of cases resulting in rupture. The average age was 28 years. The most affected age group was between 20 and 29 years old. They were predominantly married women (43.62%), nulliparous, and pauciparous (53.36%) (16).

According to an unmatched case-control study done on determinants of ectopic pregnancy in Nekemte Referral Hospital, women with single marital status were more likely to develop ectopic pregnancy than married ones. The multi-centered hospital-based case-control study was done on the determinants of ectopic pregnancy among pregnant women attending a Referral Hospital in Southwestern Ethiopia and reported that being single was an independent predictor of ectopic pregnancy (34, 37).

2.2.2. Behavioral Factors

A prospective study was conducted on forty patients who were admitted to Al-Batool Teaching Hospital, Iraq, as proven or suspected cases of ectopic pregnancy. The results indicate that 5% of patients have a positive history of smoking. It was also the primary risk factor for ectopic pregnancy, according to 225 cases and 375 control studies conducted in Turkey (38,39). Nonetheless, a retrospective case-control study conducted in India shows that it did not significantly correlate with ectopic pregnancy (36). According to a study done in the United States women who drank more than 10 grams of alcohol each day were 1.50 (95% CI) times more likely to get EP than those who never drank (40).

2.2.3. Gynecologic Factors

According to a retrospective descriptive study on ectopic pregnancy conducted in Iran, 14.0% of women reported suffering from infertility, and 5.2% of women with recent experience with this abnormality had a history of ectopic pregnancy (20). The retrospective cohort study performed in Saudi Arabia reported that the majority of patients (81.58%) were multigravidas, most likely due to previous infections resulting in tubal adhesion and damage. Also, 23.3% of the women had an IUCD in place, which can be considered a strong risk factor for ectopic pregnancy. According to this study, 9.3% of the women had a history of pelvic inflammatory disease(35).

According to a study done in China, the risk factors for EP were prior EP experiences, prior Chlamydia trachomatis infections, prior infertility, prior adnexal surgery experiences, prior appendectomy experiences, and a prior history of intrauterine device use (IUDs). Additionally, EP risk was elevated following the failure of most contraceptives used in the current cycle, including IUDs, oral contraceptive pills, levonorgestrel emergency contraception, and female sterilization (23). A 7-year retrospective study done on ectopic pregnancy in Abuja, Nigeria,

shows that 58.1% had an abortion, out of which 19.8% were induced abortions, while 41.9% had no history of abortion. 5.1% of patients had a previous ectopic pregnancy, while 94.9% did not have a previous history of ectopic pregnancy. The majority of the patients had no history of previous pelvic surgery. 85.9%, while 14.1% had a positive history of previous pelvic surgery. Pelvic adhesions were found in 73 (41.2%) at surgery (41)**.** A retrospective study conducted at Gambian Tertiary Hospital from January 2016 to April 2018 indicates that the commonest clinical feature was abdominal pain (65.1%), while the most prominent risk factors were pelvic inflammatory disease (27.9%) and previous abortion (23.3%) (42).

2.2.4. Obstetric factors

According to a retrospective study done on ectopic pregnancy in Saudi Arabia, of the most surgically managed patients, 58.5% had unilateral salpingectomy by laparotomy; 7.3% of patients underwent salpingostomy compared to 3.75% (36). A clinical retrospective study done on ectopic pregnancies in a Tertiary Care Hospital in Chittagong, Bangladesh, shows the following risk factors for ectopic pregnancy: 4.3% had a history of previous lower segmental cesarean sections (LSCS) (21). According to a retrospective study conducted on ectopic pregnancy in Benin, among the 298 patients, 7.38% (n = 22) were on contraceptive methods (4 IUDs and 18 on estroprogestative pills). The total salpingectomy was done in 88.25% (n = 263) of the overall patients; oophorectomy in 4.03% (n = 12); hysterectomy in 0.67% (n = 2); and conservative surgery in 7.05% (n = 21) (16). A six-year review done on ectopic pregnancy in Nigeria reports that radical surgery in the form of salpingectomy was the major operation carried out in 77.9% of cases; in comparison, cornual resection was done in 13.0% of cases; and conservative surgery in the form of salpingostomy was done in 4 of 16 (2.3%) (41).

2.3. Conceptual Framework

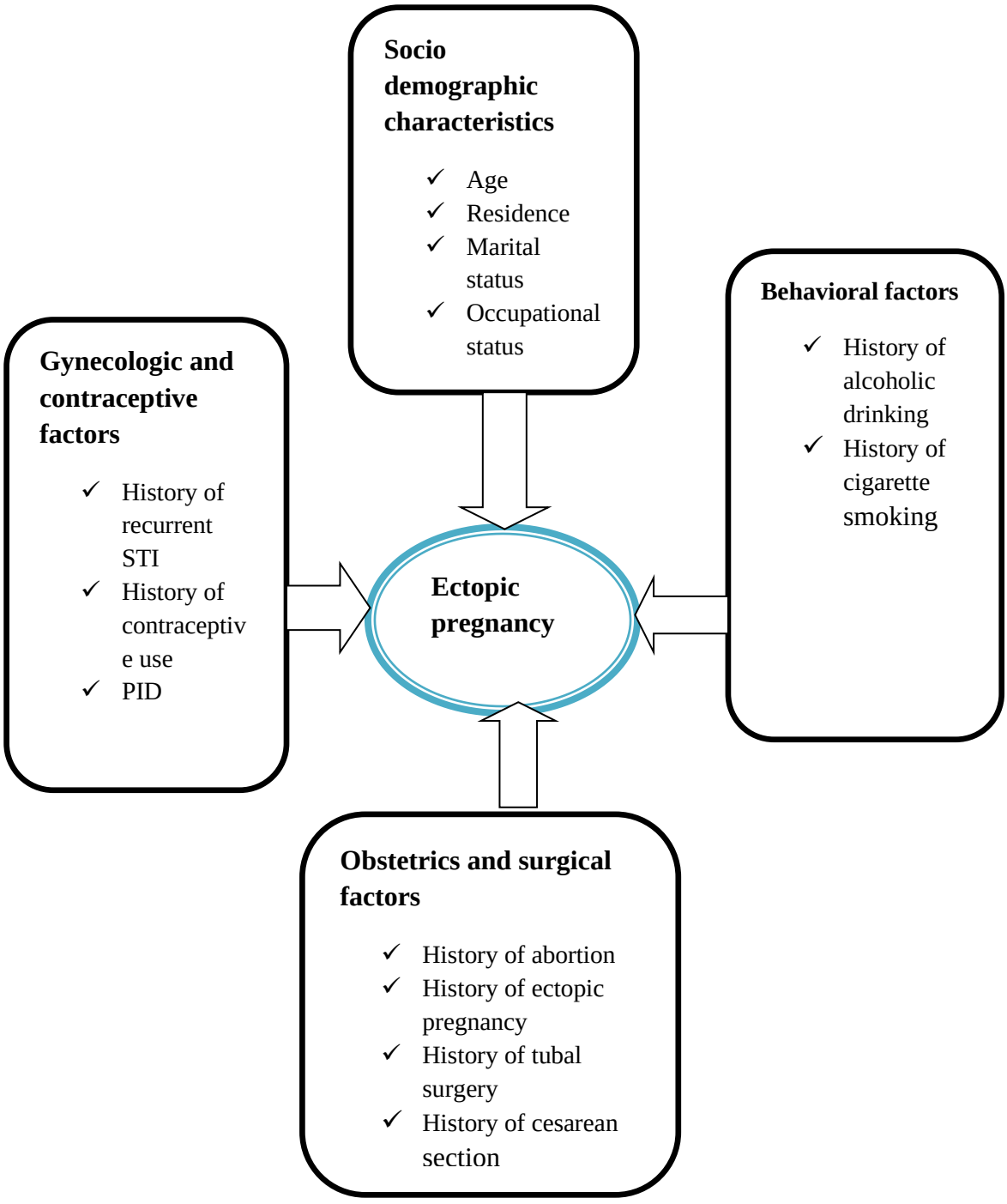

Figure 1: This conceptual framework was formulated after reviewing several relevant literature reviews.

CHAPTER THREE

3. Objectives

3.1 General Objectives

- The main aim of this study was to assess the magnitude of ectopic pregnancy, its management methods, and its associated factors among pregnant women attending Ambo University Referral Hospital in Oromia Regional State, Ethiopia, from February 2018 to April 2024.

3.2. Specific Objectives

- To determine the magnitude of ectopic pregnancy among pregnant women attending Ambo University Referral Hospital in Oromia Regional State, Ethiopia, in 2024.
- To assess the management methods of ectopic pregnancy among pregnant women attending Ambo University Referral Hospital in Oromia Regional State, Ethiopia, in 2024.
- To identify the factors associated with ectopic pregnancy among pregnant women attending Ambo University Referral Hospital in Oromia Regional State, Ethiopia, in 2024.

CHAPTER FOUR

4. METHODOLOGY

4.1. Study areas, design and period

The study was conducted at AURH West Shewa Zone, Oromia Regional State, Ethiopia. AURH was purposefully selected because it is the only large Teaching and Referral Hospital in the West Shewa zone and provides service for the entire zone and some parts of nearby zones. It has a high case flow and receives many referrals from different hospitals located within the zones. AURH is located within Ambo city, which has a latitude and longitude of 8º59ˈN, 37º51ˈE, and an elevation of 2,101 meters, which is 126 km west of Addis Ababa, Ethiopia.

It started as a referral hospital in 2016. AURH has 14 gynecologists and 40 midwives; the gynecologic ward has 24 beds; and the labor ward has 14 beds (AURH human resources directorate). This hospital provides general and specialized clinical services, including ANC, family planning, delivery service, and treatment of obstetric complications, which are some of the services provided in gynecologic and obstetric wards.

All total pregnancies and gynecological surgeries carried out within the past seven years (from February 2018 to April 2024) were 17,687 and 6,249, respectively (AURH HMIS).

4.2. Study Design and Period

Institutional-based retrospective cross-sectional study was conducted from February 1 to April 21, 2024.

4.3. Population

4.3.1. Source Population

The source of the population was all pregnant women admitted to the MCH, Gynecology and Obstetrics Department of AURH in the past seven years (from February 2018 to April 2024).

4.3.2. Study Population

The study population was all pregnant women who had been admitted to the MCH, Gynecology and Obstetrics department of AURH with a case of EP in the past seven years (February 2018 to April 2024).

4.4. Eligibility Criteria

4.4.1. Inclusion Criteria

- Documents of all pregnant mothers who were admitted with the diagnosis of ectopic pregnancy and treated with ectopic pregnancies were included**.**

4.4.2. Exclusion Criteria

- Documents of patients that were lost from the record office during data collection were not included.
- Incomplete documents of patients who lacked the date of admission and discharge were not included.

4.5 Variable of Study

4.5.1 Dependent Variable

The outcome of ectopic pregnancy

4.5.2 Independent Variable

1. Socio-demographic characteristics

- Address
- Age
- Educational status
- Ethnicity
- Marital status
- Occupation
- Religion

2. Obstetric/surgical, Gynecologic/contraceptives, and behavioral factors

- Abortion history
- Alcohol drinking
- cigarette smoking)
- Gravidity
- History of appendectomy
- History of Cesarean section
- History of Cesarean section
- History of contraceptive use.
- History of Ectopic Pregnancy
- History of STI /STD
- History of tubal surgery

4.6. Operational Definitions & Terminology

1. Ectopic pregnancy: implantation of fertilized ovum in any site outside the endometrial lining of the uterus, in which the patient presents with abnormal vaginal bleeding, abdominal pain, and amenorrhea.
2. Abortion: termination of pregnancy before it reaches viability (<28 weeks from LNMP. If GA is unknown fetal weight is less than 1000grams.
3. Pelvic inflammatory disease (PID is a spectrum of inflammatory disorders of the upper female genital tract above the internal cervical os.
4. Sexually transmitted disease: infections established through sexual contact.
5. Amenorrhea: the absence of menstruation
6. Appendectomy: surgical removal of the appendix
7. Salpingectomy: surgical removal of fallopian tubes
8. Oophorectomy: surgical removal of the ovary
9. Hysterectomy: surgical removal of the uterus
10. Gravity: number of pregnancies, including the present one, irrespective of the outcomes
11. Shock: a state of deranged vital signs with systolic B/P<90/60mmHG (1,7,33)

4.7. Sample Size and Sampling Procedure

4.7.1. Sampling Technique and Procedures

Records of all pregnancies and gynecological admissions to AURH in the seven years from February 1, 2018, to April 21, 2024), were reviewed. All records of women who had an ectopic pregnancy and who were managed for ectopic pregnancy from February 1, 2018, to April 21, 2024, that were eligible were included in the study and used for data analysis.

A medical record number (MRN) of all the patients admitted to the gynecological and obstetric ward was collected from the registration book of a hospital. Then, from the collected medical record numbers, the medical record numbers (MRN) of all patients managed with an ectopic pregnancy were identified. Purposive, non-probability sampling techniques were applied. Then the cards were searched in the patient's card room by the data clerk. All data were collected by trained data collectors.

4.7.2. Data Collection Tool

The standardized checklist was used. A semi-structured questionnaire was developed and modified in a local context based on reviewing relevant kinds of literature. The questionnaires were prepared in English.

Before the actual data collection, the checklist was pre-tested on 5% of pregnant women in Wollega University Referral Hospitals. Then, necessary corrections were made based on the results of the pre-test of the instrument. Data were collected by Kobo Toolbox version 2022.4.4, a powerful and reliable software used for data collection and management. Skip logic and validation criteria in the Kobo Toolbox account were made to control the quality of data collection. Training about the Kobo Toolbox was given to data collectors. The data were collected by one trained midwife and one nurse. One health officer was the supervisor.

4.7.3 Data Processing and Analysis

The questionnaire was checked for completeness and internal consistency. Data were processed using SPSS 26 version software and summarized using statistical procedures, descriptive statistics were analyzed. Multivariate linear logistic regression analysis was executed to select candidate variables for multivariable logistic regression to identify the predictors.

Variables with a p-value of less than 0.25 were selected for multivariable logistic regression, and 95% confidence intervals (CI) were used to describe the association between the outcome of

ectopic pregnancy and potential risk factors. Variables with a p-value < 0.05 in the multi-variable analysis were considered significant risk factors for ectopic pregnancy.

4.8. Data Quality Assurance

Data were collected through the standardized checklist. The quality of the data was ensured during data collection, coding, export, and analysis. During data collection, adequate training and close follow-up were given to data collectors and supervisors. Incomplete checklists were returned to the data collector for completion.

4.9. Ethical Consideration

Ethical approval or an official permission letter was obtained from the Department Research and Ethics Review Committee (DREC) of the Department of Anatomy, Meeting No.DRERC/13/20/2024, the College of Health Science (CHS), and Addis Ababa University (AAU). A permission letter (a formal letter of cooperation) was written to the Ambo University referral hospital (AURH) administration office, and the study was started after receiving formal permission from them. The confidentiality of the patients was maintained. Their name and personal identifiers were not written on the questionnaire.

4.10. Dissemination of Results

The findings of this study shall be presented in public defense and submitted as an M. Sc. thesis to the Addis Ababa University Department of Anatomy. Then it will be disseminated to the Addis Ababa University research unit and communicated to the local health planners and other possible stakeholders, such as the administration of the hospital and the Ministry of Health. Finally, the findings will be disseminated through publications and may be used in scientific conferences and workshops.

CHAPTER FIVE

5. RESULT

5.1 Magnitude of Ectopic Pregnancy

During the period under review from February 2018 to April 2024, there were 6,249 gynecologic admissions and a total number of 17,687 pregnancies were recorded. Out of this 182 were diagnosed with ectopic pregnancy, among the diagnosed ectopic pregnancies, of which 173 cases were fit for data analysis. However, the remaining 9 cases were excluded by exclusion criteria. The overall magnitude of ectopic pregnancy in this study was 0.98% (173 of 17,687) pregnancies; which accounted for 2.77% (173 of 6,249) of all gynecologic admissions during the study period.

5.2 FACTORS ASSOCIATED WITH ECTOPIC PREGNANCY

Sociodemographic Characteristics

As indicated in Table 1. Below, the majority of the cases 121 (69.9%) were urban residents. The majority of the patients 81 (46.8%) were within the age group 25-29 years with the mean age of the patient being 27.16 (SD± 4.77) years. The majority of the patients were married 98 (56.6%) and 55 (31.8%) were single. As shown in Figure 2, below the majority of the participants of this study were Oromo 65 (37.6 %) and Amhara 54 (31.2 %). Regarding the level of education about 58 (33.5 %) participants completed their high school education, and 55 (31.8 %) participants completed their college and above education.

Most of the women in this study were housewives 79 (45.7 %) and merchants 20 (11.6%) by occupation. About 91 (52.6 %) women were Orthodox and 52 (30.1 %) women were Protestant by religion.

Table 1: Sociodemographic characteristics of patients with ectopic pregnancy in Ambo University Referral Hospital (from February 2018 to April 2024).

Sociodemographic characteristics	Frequency (n=173)	Percent (100%)
Age group		
≤ 19	5	2.9
20-24	45	26.0
25-29	81	46.8
30-34	22	12.7
35-39	18	10.4
40 and above	2	1.2
Mean = 27.16±4.77SD		
Marital status		
Married	98	56.6
Widowed	5	2.9
Divorced	15	8.7
Single	55	31.8
Educational status		

Unable to read and write	29	16.8
1-8 Grade	31	17.9
9-12 Grade	58	33.5
College and Above	55	31.8
Residence		
Rural	52	30.1
Urban	121	69.9
Occupation		
Housewife	79	45.7
Government employee	14	8.1
Merchant	20	11.6
Daily laborer	5	2.9
Others	55	31.8
Religion		
Orthodox	91	52.6
Muslim	26	15.0

Protestant	52	30.1
Other	4	2.3
Ethnicity		
Oromo	65	37.6
Amhara	54	31.2
Tigre	24	13.9
Gurage	26	15.0
Others	4	2.3

SD= Standard deviation

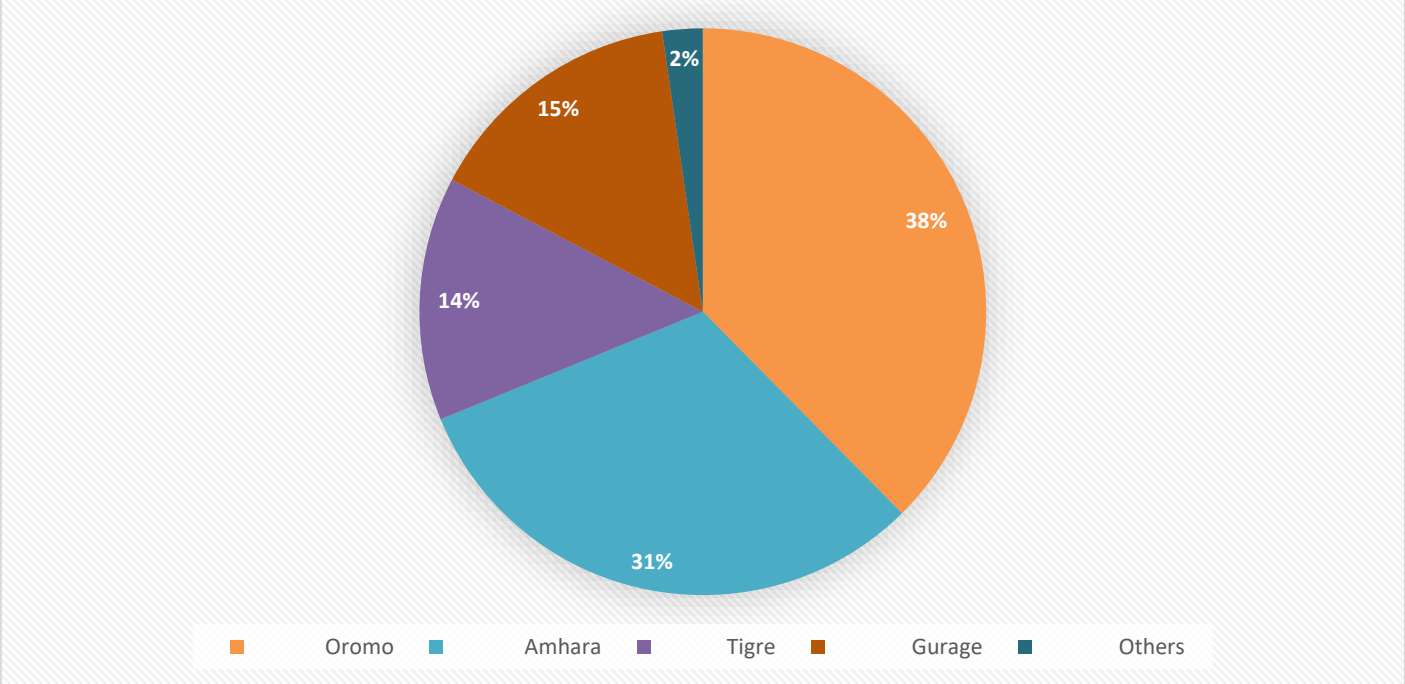

Figure 2: Ethnicity of patients with ectopic pregnancy in Ambo University Referral Hospital (from February 2018 to April 2024).

5.3 MANAGEMENT OUTCOME OF ECTOPIC PREGNANCY

Gestational age (GA) at presentation and parity are shown in Table **2.** It was found that the majority of the patients, 149 (86.1%) had a history of amenorrhea of < 7 weeks and 18 (10.4%) of patients had a history of amenorrhea of 7-9 weeks. With a mean gestation of 7.2 SD± 0.46. Among the reviewed patients' cards the majority of the patients, 51 (29.5%), were nulliparous, and 40 (23.1%) of the participants were multiparous. With a mean parity of 2.95 SD±1.72.

Table 2: Gestational age and parity of patients with ectopic pregnancy in Ambo University Referral Hospital (from February 2018 to April 2024).

Gestational age in weeks	**Frequency (n=173)**	**Percent (100%)**
< 7 weeks	149	86.1
7- 9 weeks	18	10.4
>9 weeks	6	3.5
Parity		

0	51	29.5
1	28	16.2
2	40	23.1
3	9	5.2
4	22	12.7
>5	23	13.3

5.3.1The Mode of Presentation

Figure 3 depicts the patients' clinical appearance. The most prevalent chief complaint that patients complained of was abdominal pain, which was reported by 77 (44.5%) of the patients, followed by abnormal vaginal bleeding in 53 (30.6%) of the patients. Just 6 (3.5%) of the patients had syncope as their primary complaint, whereas 37 (21.4%) of the patients had amenorrhea.

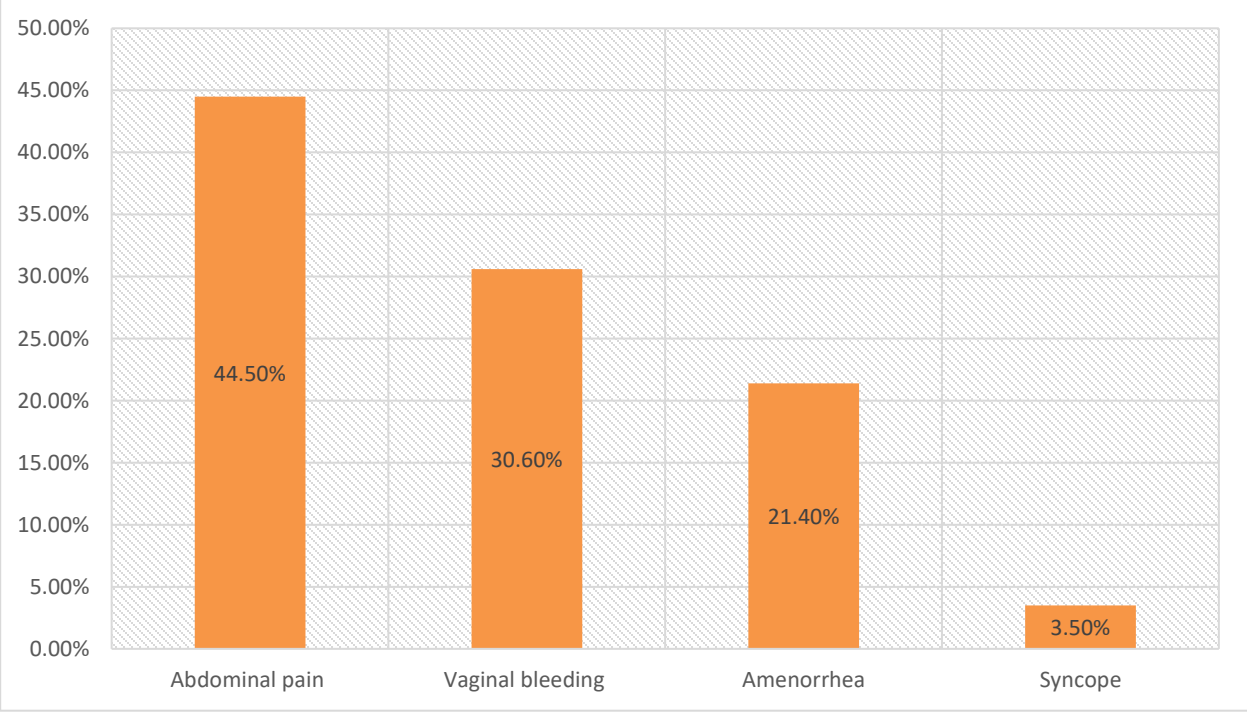

Figure 3: Clinical presentation of the patient with ectopic pregnancy in Ambo University Referral Hospital (from February 2018 to April 2024).

5.3.2 The Diagnosis of Ectopic Pregnancy

In this study, a urine pregnancy (HCG) test was performed on all the women, and the results were all positive. Out of these, 94 cases (54.3%) of ectopic pregnancies were identified using a combination of clinical, culdocentesis, and ultrasound scans; another 65 cases (37.6%) were identified through a combination of clinical and ultrasound scans. Intraoperatively, ectopic pregnancy cases were discovered in just 9 (5.2%) patients.

In our study, the right-side fallopian tube accounted for 144 (83.2%) of the ectopic pregnancy cases, whereas the left-side fallopian tube had 29 (16.8%) cases. It is shown both in Figure 4 below and in Table 4 below.

Table 3: Diagnosis of the patient with ectopic pregnancy in Ambo University Referral Hospital (from February 2018 to April 2024).

Diagnosis	**Frequency(n=173)**	**Percentage (100%)**
Clinical and U/S	65	37.6
Clinical and culdocentesis	5	2.9
Clinical, Culdocentesis, and U/ S	94	54.3
Intraoperative	9	5.2
Total	173	100.0
Laterality of EP		
Right-side FT	144	83.2

Left-side FT	29	16.8
Total	173	100.0

EP=Ectopic pregnancy, **FT=**Fallopian tube

Table 4

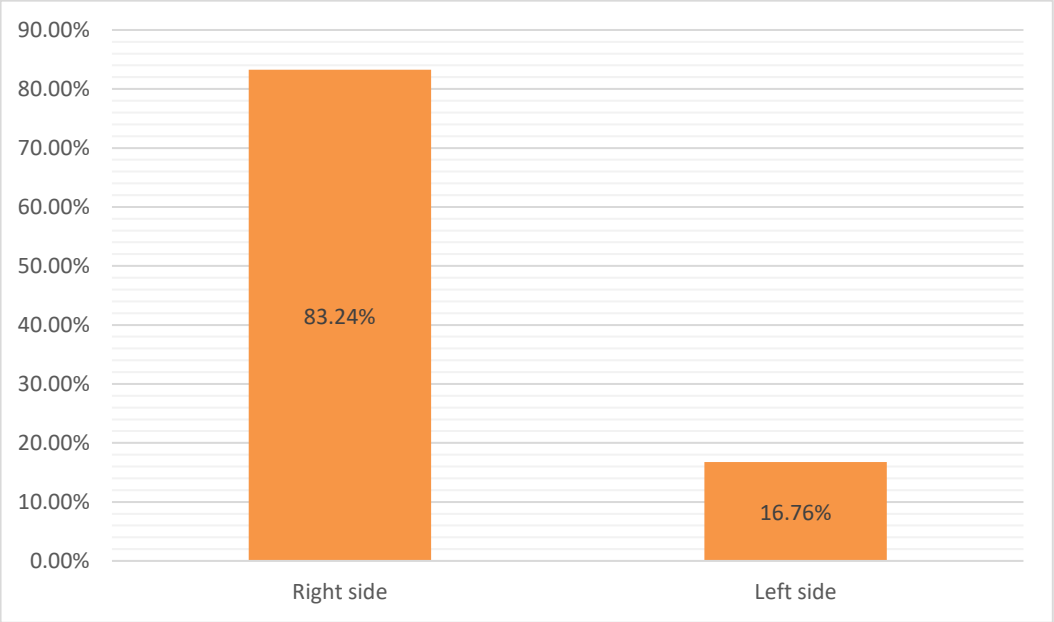

Figure 4: Laterality of ectopic pregnancy in Ambo University Referral Hospital (from February 2018 to April 2024

Table 4 below shows the site of ectopic pregnancy, and it was found that tubal ectopic pregnancy was the commonest site with 91.9% (159) cases, followed by ovarian ectopic pregnancy with 5.2% (9) cases, and only one case of cervical ectopic pregnancy was recorded.

As seen in Figure 6, there were 106 cases (61.3%) of tubal ectopic pregnancies, of which 33 cases (19.1%) were isthmic; 19 cases (11%) were infundibulum ectopic pregnancies; 12 cases (6.9%) were fimbriae ectopic pregnancies; and the fewest cases (3.7%) were cornual ectopic pregnancies.

In this study, 160 (92.49%) cases were recorded as ruptured ectopic pregnancies. while 13 (7.5%) cases were recorded as unruptured ectopic pregnancies. It is shown in Figure 5 below.

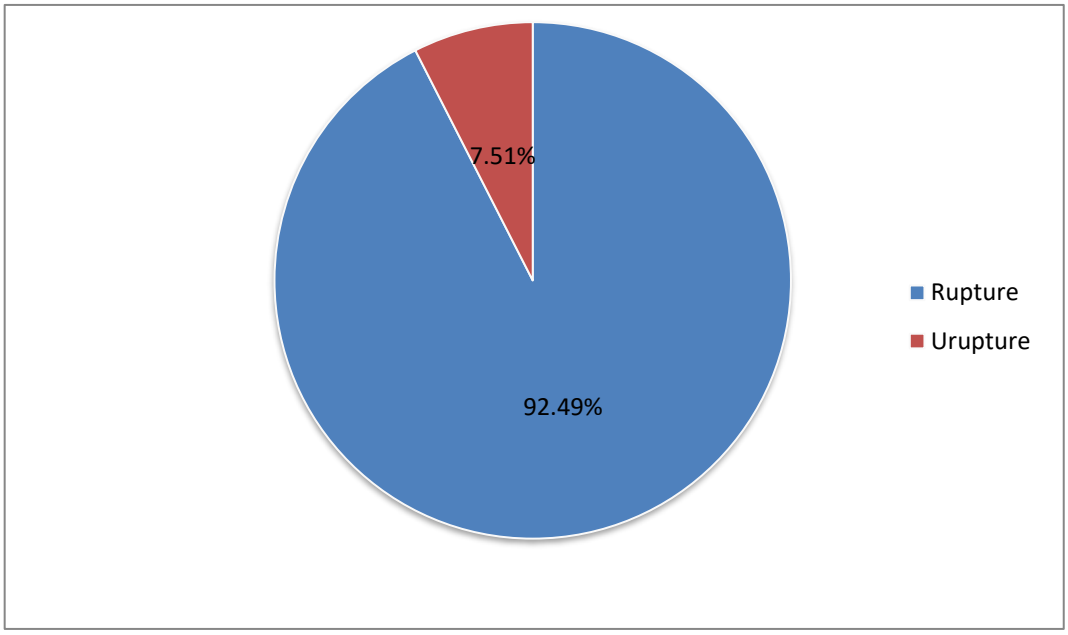

Figure 5: Condition of ectopic pregnancy in Ambo University Referral Hospital (from February 2018 to April 2024).

Table 4: Type and site of ectopic pregnancy in Ambo University Referral Hospital (from February 2018 to April 2024).

Type	Frequency(n=173)	Percent (100%)
Tubal	159	91.9
Abdominal	3	1.7
Ovarian	9	5.2
Cervix	1	.6
Site of EP		
Ampulla	106	61.3
Isthmus	33	19.1

Fimbrie	12	6.9
Infundibulum	19	11.0
Cornual	3	1.7
Total	173	100.0

EP= Ectopic pregnancy

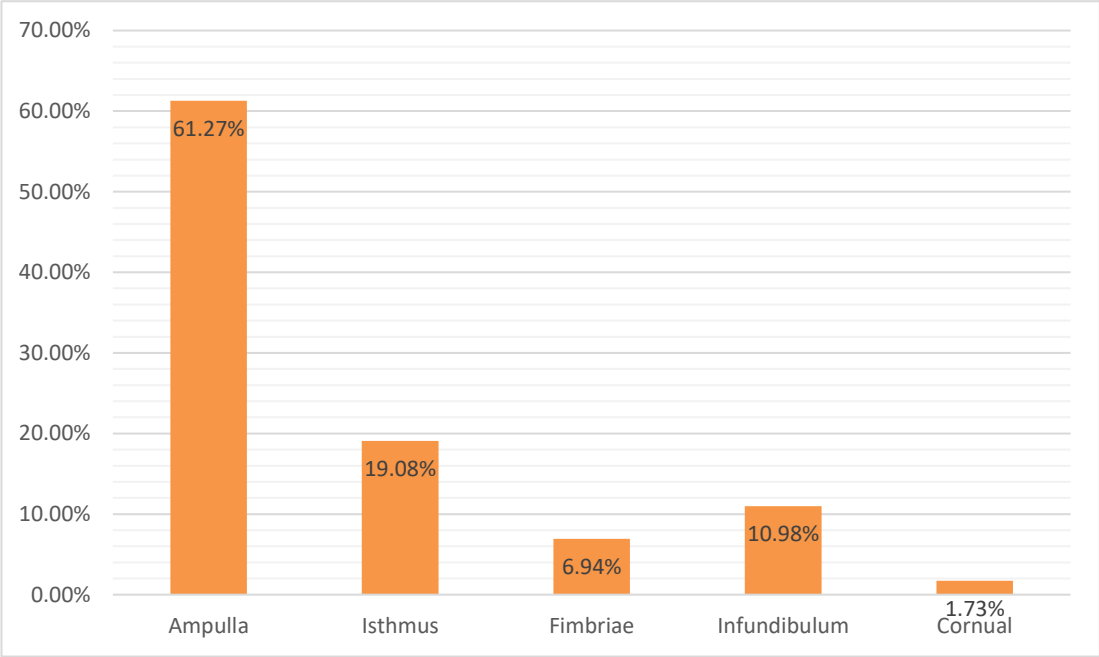

Figure 6: The site of ectopic pregnancy in Ambo University Referral Hospital (from February 2018 to April 2024).

5.3.3Treatment Modality of Ectopic Pregnancy

All 173 women who were diagnosed with ectopic pregnancy underwent surgical treatment, as shown in Table 7 below. The most common treatment for ectopic pregnancy was salpingectomy, which was used in 133 cases (76.9%). Other treatments included salpingo-oophorectomy in 31, 17.9% of cases, oophorectomy in 6, 3.5% of cases, and cornual resection in 3 cases (1.7%).

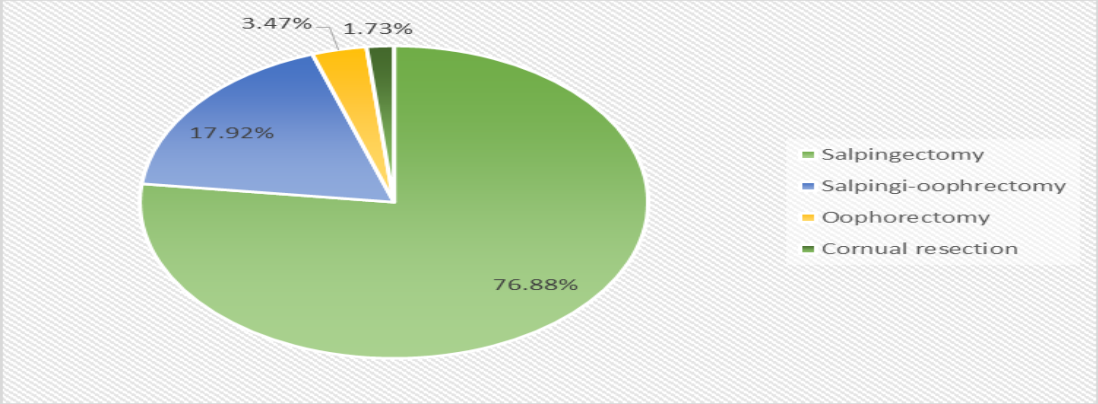

Figure 7: The treatment modality of ectopic pregnancy.

Categories	Frequency (N=173)	Percent (100%)
Hgb level		
<5g/dl	3	1.7
5-10g/dl	47	27.2
>10g/dl	123	71.1
Blood group		
A	94	54.3
B	65	37.6

	O	14	8.1
Blood loss			
	<500ml	99	57.2
	500ml -1000ml	64	37.0
	1000ml - 1500ml	7	4.0
	>1500ml	3	1.7
Hospital stay			
	< 7 days	89	51.4
	7-14 days	75	43.4
	> 14 days	9	5.2
Postoperative complications			
	Anemia	33	19.1
	Postoperative fever	15	8.7
	Wound infection	4	2.3

	Urinary tract infection	6	3.5
	None	115	66.5
Total		173	100.0

Table 5: Hemoglobin level, blood loss, blood group, and postoperative complications of patients treated with ectopic pregnancy in Ambo University Referral Hospital (from February 2018 to April 2024).

As indicated in Table 5 above, the hemoglobin level was >10 g/dl in 71.1% (123) patients and 5–10 g/dl in 27.2% (47) patients. The dominant blood group in this study was A, with 94 (54.3%) of the patients, followed by B and O, accounting respectively for 65 (37.6%) and 14 (8.1%). The estimated intraoperative blood loss was <500 ml in 99 (57.2%) and 500 ml–1000 ml in 64 (37.0%) cases. Regarding the postoperative complications, only 4 (2.3%) cases developed wound infections, whereas 6 (3.5%) cases developed urinary tract infections.

Table 6. Below are the gynecologic, obstetric, and behavioral factors of patients with ectopic pregnancy.

The majority of the patients, 62 (35.2%), had a previous history of cesarean section, 57 (32.9%) of the patients had a history of recurrent STIs or STDs, and 17 (9.8%) of the patients had a previous history of pelvic inflammatory disease.

Whereas 53 (30 %) of the patients had a history of injectable contraceptive methods, and 38 (22.0%) of the patients were ECP users. Patients with a previous history of ectopic pregnancy and a history of tubal surgery were 9 (5.2%), 7 (4.0%), and 9 (5.2%), respectively.

Regarding the cigarette smoking habits of the patients, 4 (2.3%) patients were passive cigarette smokers, and 3 (1.7%) patients were active cigarette smokers. Of those, 1 (0.6%) patient had a smoking history of less than or equal to 3 years, while 2 (1.2%) patients had a smoking history of greater than or equal to 4 years. 9 (11.0%) of the patients had a history of alcohol consumption.

Table 6: Gynecologic, obstetric, and behavioral factors of patients treated with ectopic pregnancy in Ambo University Referral Hospital (from February 2018 to April 2024).

Characteristics		**Frequency**	**Percent (100%)**
Hx of Cesarean section	Yes	62	35.8
	No	111	64.2
Hx of recurrent STIs/STDs	Yes	57	32.9
	No	116	67.1
PID	Yes	17	9.8
	No	156	90.2
Injectable contraceptive	Yes	53	30.6
users	No	120	69.4
ECP users	Yes	38	22.0
	No	135	78.0
Implanon users	Yes	37	21.4
	No	136	78.6

IUCD users	Yes	20	11.6
	No	153	88.4
OCP users	Yes	13	7.5
	No	160	92.5
Hx of ectopic pregnancy	Yes	9	5.2
	No	164	94.8
Hx of tubal surgery	Yes	7	4.0
	No	166	96.0
Hx of appendectomy	Yes	9	5.2
	No	164	94.8
Hx of Infertility	Yes	9	5.2
	No	164	94.8
Hx of abortion	Yes	14	8.1
	No	159	91.9
Hx of cigarette smoking	Non-smoker	166	96.0

	Passive smokers	4	2.3
	Active smokers	3	1.7
Hx of alcohol consumption	Yes	19	11.0
	No	154	89.0
Total		173	100.0

Hx = History

5.4 LOGISTIC REGRESSION

5.4.1 Bivariate logistic regression

Variables with a p-value < 0.25) were found to be significant in bivariate analysis. Therefore, those mothers who had a previous history of abortion [COR 8.42, 95% CI 1.43–17.21], a history of STIs [COR 3.99, 95% CI 1.53–16.31], a history of PID [COR 6.33, 95% CI 1.36–19.32], history of ectopic pregnancy [COR 16.22, 95% CI 3.16–24.62], history of tubal surgery [COR 21.91, 95% CI 6.19–36.14], and cigarette smoking [COR 11.68, 95% CI 3.78–19.04] showed statistical association with unfavorable outcome of ectopic pregnancy.

Table 7: Bivariate analysis of factors with management outcome of ectopic pregnancy in Ambo University Referral Hospital (from February 2018 to April 2024).

Variable		**EP management outcome**		**COR 95% CI**	**P value**
		Favorable	Unfavorable		
Residence	Urban	103 (85.1%)	18 (14.9%)	1	

	Rural	23 (44.2%	29 (55.8%)	7.21(1.76- 26.12)	0.416
History of	No	97(83.6%)	19 (16.4%)	1	
STIs	Yes	32 (56.1%)	25 (43.9%)	3.99 (1.53- 16.31)	0.018*
History of	No	121 (77.6%)	35(22.4%)	1	
PID	Yes	6 (35.3%)	11 (64.7%	6.33 (1.36- 19.32)	0.002*
History of	No	146 (89%)	18 (11%)	1	
EP	Yes	3 (33.3%)	6 (66.7)	16.22 (3.16 – 24.62)	0.03*
History of	No	149(89.8 %)	17(10.2%)	1	
tubal	Yes	2 (28.6%)	5 (71.4%)	21.91 (6.19- 36.14)	0.0032*
surgery					
History of	No	140 (85.4%)	24 (14.6%)	1	
infertility	Yes	2 (22.8%)	7 (77.8%)	20.41 (6.17-48.15)	0.827
History of	No	131(82.4 %)	28 (17.6%)	1	
abortion	Yes	5 (35.7)	9 (64.3%)	8.42(1.43 -17.21)	0.01*
	No	149 (89.8 %)	17 (10.2 %)	1	

Cigarette smoking	Yes	3 (42.9%)	4 (57.1%)	11.68 (3.78-19.04)	0.002*
Gestational age	< 7 Weeks	129 (86.6%)	20 (13.4%)	1	
	7-9 Weeks	11 (61.1%)	7 (38.9%)	4.10 (1.37- 9.38)	
	>9 Weeks	2 (33.3%)	4 (66.7%)	1.57 (0.63 -6.14)	
Hemoglobin level	<5g/dl	1 (33.3%)	2(66.7%)	2.81 (0.71-5.91)	
	5-10g/dl	12(25.5%)	35 (74.5%)	1.34 (0.65- 4.12)	0.386
	>10g/dl	112 (91.1%)	11(8.9%)	1	
Parity	0	45 (88.2%)	6 (11.8%)	1	
	1	19 (67.9%)	9 (32.1%)	3.55 (0.71-5.13)	0.004*
	2	19 (37.5%)	21 (62.5%)	1	
	3	2 (22.2%)	7 (77.8%)	3.17 (0.77-11.78)	
	4	10 (45.5%)	12 (55.5%)	1	
	>5	4 (17.4%)	19(82.6%)	3.96 (1.27-9.36)	0.026*

**** = For variables showing significant association during multivariate analysis ($P \leq 0.05$)

* = For variable showing significant association during bivariate analysis ($P \leq 0.25$)

5.4.2 Multivariate logistic regression

Variables with a p-value < 0.25 on bivariate logistic regression analysis were selected as candidate variables for multivariate logistic regression. Therefore, multivariate logistic regression analysis was performed to identify which variables were associated with and predict the unfavorable outcomes of ectopic pregnancy. Variables with a p-value < 0.05 in multivariate logistic regression were found to be significant. As a result, variables like PID, STIs, previous history of ectopic pregnancy, previous history of abortion, previous tubal surgery, and parity were found to have significant associations with EP management outcomes on multivariate logistic regression analysis. Mothers who had a previous history of PID were five times more likely to have unfavorable outcomes from ectopic pregnancy than those with no PID (AOR 5.23, 95% CI 0.28–15.19). Those mothers with a previous history of ectopic pregnancy were eleven times more likely to have ectopic pregnancy than those who had no previous history of ectopic pregnancy (AOR 11.34, 95% CI 6.12–21.74).

Those mothers who had a previous history of abortion were six times more likely to have an ectopic pregnancy than those who had no previous history of abortion (AOR 6.29, 95% CI 0.16–12.28).

Mothers who had a previous history of tubal surgery were thirteen times more likely to have an ectopic pregnancy than those with no previous history of tubal surgery (AOR 13.41, 95% CI 4.37–23.82). These mothers who had a history of STIs were three times more likely to have an ectopic pregnancy than those with no STIs (AOR 3.15, 95% CI 1.28–11.13).

Table 8: Multivariate analysis of factors with management outcome of ectopic pregnancy in Ambo University Referral Hospital (from February 2018 to April 2024).

Variable		**Management outcome**			
		Favorable	**Unfavorable**	**AOR 95% CI**	**P - value**
History	No	97(83.6%)	19 (16.4%)	1	
STIs	Yes	32 (56.1%)	25 (43.9%)	3.15 (1.28- 11.13)	0.2012**
History of	No	121 (77.6%)	35(22.4%)	1	
PID	Yes	6 (35.3%)	11 (64.7%	5.23 (0.28 -15.19)	0.0021**
History of	No	146 (89%)	18 (11%)	1	
EP	Yes	3 (33.3%)	6 (66.7)	11.34(6.12 -21.74)	0.0312**
History of	No	131(82.4 %)	28 (17.6%)	1	
abortion	Yes	5 (35.7)	9 (64.3%)	6.29 (0.16- 12.28)	0.019**
Cigarette	No	149 (89.8 %)	17 (10.2 %)	1	
smoking	Yes	3 (42.9%)	4 (57.1%)	5.17(1.23- 14.23)	0.2768*
History of	No	149(89.8 %)	17(10.2%)	1	
tubal	Yes	2 (28.6%)	5 (71.4%)	13.41(4.37- 23.82)	0.0038**
surgery					

Parity	Nulliparous	45 (88.2%)	6 (11.8%)	1	
	≥1	54 (44.3%)	68 (55.7%)	9.44 (0.68 -13.16)	0.001**

** = For variables showing significant association during multivariate analysis (P≤0.05)

* = For variable showing significant association during bivariate analysis (P ≤0.25)

5. 5 Discussion

This institutional-based retrospective study tried to determine the magnitude, management outcomes, and factors associated with the management outcome of ectopic pregnancies treated in Ambo University Referral Hospital, Oromia region of Ethiopia.

The study found that the magnitude of ectopic pregnancy in this study was recorded at 0.98% (98 out of 10,000 pregnancies); this finding was consistent with studies at Adigrat Hospital in Tigray, Ethiopia (0.82%) (7), with studies at El-Galaa Hospital, Egypt (0.62% and 0.72%) (32), 0.89% at a tertiary hospital in Eastern Nigeria (43), and 0.97% in India (29). These studies were conducted with the same study design, a cross-sectional retrospective study, and a similar study setting, at teaching and referral hospitals where more complicated cases are managed.

However, this finding was lower than with 2.2% reported studies in South Africa (6), 2.05% reported studies in the Volta Region of Ghana (18), 1.89% reported studies in the University Hospital of Benin (16), 1.5% reported studies in Adama, Ethiopia (44), 1.3% reported studies in Nnamdi Azikiwe University, Nigeria (45), and 1.1% reported studies in Nigeria (14).

Furthermore, this result was higher than that of the studies conducted in the Gambia (43 cases; 0.2%), Egypt (2018) (45 cases; 0.51%), and India (100 cases; 0.52%) (32,42,46). This is because, in this particular study setting, the sample size was comparatively larger.

Moreover, these disparities might be related to differences in environmental factors (exposure to toxic materials), the distribution of related infections (sexually transmitted infections), and behavioral factors (smoking). Therefore, such factors are known to increase the risk of ectopic pregnancy. Smoking can delay the passage of the fertilized ovum into the endometrial lining and its implantation by changing the tubal motility, which can impair the immunity of women, thus making them prone to infections. Furthermore, studies indicate that smoking can modify the

epithelial cell turnover in the fallopian tube, which increases cellular proliferation and decreases cell death, resulting in structural changes in the epithelial cell surface structure (13,47,48).

Additionally, exposure to diethylstilbestrol (DES) in gestation increased the chance of ectopic pregnancy because of abnormal tubal morphology and potentially compromised fimbrial function (1,48–50).

Thus, according to the South African study, up to 86% of women who experienced ectopic pregnancies had evidence of previous genital infections; similarly, 42.95% of women in Benin and 35.5% of women in Nigeria had similar evidence. In this study, however, 32.5% of women who experienced ectopic pregnancies had previously experienced genital infections. Furthermore, 0.67% of women in Benin who had ectopic pregnancies had a history of ovulation induction, which was not found in the current study. It can affect the transfer of tubal embryos. However, the exact mechanism is unclear. Evidence from the research reveals that infection and smoking could hinder the movement of oocytes and embryos via the oviduct by destroying several cilia (51,52).

The majority of the women in this study 98 (56.6%) were married, and 81 (46.8%) were between the ages of 25- 29 years old, with a mean age of 27.16 (SD± 4.77) years. This finding was comparable to studies done in Nepal, Nigeria, and Benin (16, 45–47). This could be a consequence of the fact that the women in this decade are experiencing their peak periods of fertility and sexual activity. Moreover, young women are biologically vulnerable to sexually transmitted infections because of the columnar epithelium that extends from the endocervical canal to the ectocervical canal, which makes them fully exposed to pathogens like Chlamydia trachomatis, Neisseria gonorrhea, Mycoplasma, and mixed aerobes and anaerobes (46,49,50).

A previous ectopic pregnancy, previous tubal surgery, and pelvic inflammatory disease were major risk factors in this study. Hence, mothers with a previous history of ectopic pregnancy were eleven times more likely to have an ectopic pregnancy than those who had no previous history of ectopic pregnancy. Mothers who had a previous history of PID were five times more likely to have an ectopic pregnancy than those with no PID, and mothers who had a previous history of abortion were six times more likely to have an ectopic pregnancy than those who had no previous history of abortion. This was similar to studies done in Tigray, Ethiopia, Lagos, Nigeria, Yaounde,

Cameroon, and Benin, Nigeria (7, 17, 45, 48). Additionally, this finding was also corroborated by the globally recognized risk factors for the overall increase in the incidence of ectopic pregnancy.

This is because pelvic infection may change tubal function, tubal blockage, tubal adhesion, deciliation (a decrease in the number of cilia and activity of cilia in the fallopian tube), and fimbrial destruction. According to certain studies, a history of chlamydial infection causes the formation of a protein called PROKR2, which increases the likelihood that a pregnancy will implant in the tubes (1,49,50).

Previous tubal surgery, previous ectopic pregnancy, and abortion can cause tubal and uterine wall damage, alteration of the normal tubal environment, fimbrial phimosis, tubal occlusion, and hydrosalpinx (a condition where fluid and serosa build up in the fallopian tube and cause its swelling). Apart from this, they can also increase the possibility of infections and their impact (1,46,53).

The majority of the women in this study were multiparous, with a mean parity of 2.95 SD±1.72. This study was supported by a study done in Nepal, Nigeria, and Pakistan (1, 9, 13)(41). However, this was not supported by a study done in Hamadan, Iran, in which most of the women in that study were nulliparous and primiparous (20). On the other hand, Williams and Obstetrics, 26th edition, asserts that as the number of deliveries rises, so does the probability of ectopic pregnancy (1). This is because with advancing age and parity, tubal myoelectric activity decreases. As a result of the tubal peristaltic action slowing down, the zygote implants before it enters the uterine cavity (53,54).

The findings of this study, also supported by a population-based study done in France, assert that multiparous women are more likely to experience an ectopic pregnancy. They are more likely to be exposed to most risks. However, the physiological effect of an advanced age during conception on the likelihood of an ectopic pregnancy is unknown. Age-related changes in tubal function may lead to tubal implantation by postponing ovum transfer (55).

Abdominal pain was the most common clinical profile of the patients in this study. Because of the rupture of the fallopian tube, there is leakage of blood that results in intraabdominal blood collection (hemoperitoneum), followed by abnormal vaginal bleeding, amenorrhea, and syncope.

This was similar to the study performed in India, Nigeria, Ethiopia, and Cameroon (17, 26, 33, 48).

The majority of the ectopic pregnancies recorded were ruptured 160 (92.49%) because the growing embryo became too big for the tube's lumen to hold, causing the tube to break and burst. In addition to this, the fallopian tube lacks a submucosal layer. The fertilized ovum immediately burrows the epithelium, causing the zygote to lie close to or inside the muscular layer, invaded by trophoblasts that proliferate quickly. This agreed with the study done in Bangladesh, Nigeria, Ghana, and Gambia (1, 18, 21, 40, 41).

It indicates a delayed diagnosis because of poor health-seeking behavior, a lack of knowledge about the negative impacts of EP, and poverty.

This study showed that the predominant site of ectopic pregnancy was tubal ectopic pregnancy 159 (91.9%), and the ampulla was the most commonly affected segment of the tube 106 (61.3%) because of its anatomical nature, which is the longest and widest segment of the tube where fertilization normally occurs. It is also followed by an isthmus 33 (19.1%). The majority of them were right-sided tubal ectopic pregnancies 144 (83.24%). This finding was similar to studies in Nigeria, India, Bangladesh, and South Africa (2, 6, 21, and 40). This was probably due to latent inflammation of the appendix.

In this study, only one case of cervical ectopic pregnancy was recorded, and no death was recorded, unlike a study done in Nigeria (56).

Salpingectomy was the most often used treatment for ectopic pregnancy in this study, accounting for 133 (76.9%) of the cases. This was consistent with research conducted in Adigrat, Ethiopia (70.1%), Yaounde, Cameroon (95.6%), Andhra Pradesh, India (72%), and Ilorin, Nigeria (85.1%) (5, 7, 17, 45). This is because the majority of the patients presented with ruptured ectopic pregnancy and hemoperitoneum, which manifested by vaginal bleeding and abdominal pain. In such conditions, emergency surgical intervention remains the mainstay of treatment in developing countries like Ethiopia.

The majority of the 149 (86.1%) patients presented at an estimated gestational age of < 7 weeks in this study. This was in line with many other studies done in Nigeria, Iraq, Saudi Arabia, and

Ethiopia (7,38,56,57). The majority of the patients, 123 (71.1%), presented with hemoglobin levels > 10 g/dl, and the estimated intraoperative blood loss was < 500 ml in 99 (57.2%) cases in the present study. This was similar to the study done in Ethiopia and Benin, (7,16). The dominant blood group in this study was A 94 (54.3%) and B 65 (37.6%). This differs from the study done in Benin in which the blood O group was the dominant one(16). This needs further research.

This study's most frequent postoperative complications were anemia 33 (19.1%) and postoperative fever 15 (6.7%). This result was in line with the study done in Nigeria (45). There are various reasons for postoperative anemia. It may arise from pre-existing preoperative blood loss manifested by vaginal bleeding and operational blood loss that aggravates hemodilution (58).

Postoperative fever can result from several causes, including physiologic fever brought on by an inflammatory response to tissue damage during surgery, atelectasis from general anesthesia that alters breathing patterns by deflating air sacs and reducing diaphragmatic excursion, urinary tract infections from Foley catheters, deep vein thrombosis and antibiotics (59,60).

5.6 Strengths and Limitations of the Study

Strengths

- This study was conducted with a relatively large sample size as compared with others.
- As a retrospective study, the extracted data was real-world and unbiased.
- As the data was pre-existing data (secondary data), the researcher did not influence the outcome of a variable.
- The study was efficient and cost-effective, with rapid data collection.

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Limitations

- Being single centered study

Barriers / Challenges

- It faced incomplete information, unreadable, and unclear handwriting on the patient's card.

5.7 Conclusion

The magnitude of the ectopic pregnancy in this study was 0.98%, which is similar to the global range. The majority of the patients attending Ambo University Referral Hospital for ectopic pregnancy were between the ages of 25 and 29 years old, with a mean age of 27.16±4.77, married, and from urban areas. In this study, the majority of the 149 (86.1%) patients presented at an estimated gestational age of < 7 weeks, 123 (71.1%) presented with a hemoglobin level >10 g/dl, and the estimated intraoperative blood loss was < 500 ml in 99 (57.2%) cases.

The right-side fallopian tube accounted for 144 (83.2%) ectopic pregnancy cases, whereas the left-side fallopian tube had 29 (16.8%) cases. Ruptured 160 (92.49%) ectopic pregnancies were the most common type, with the tube breaking and rupturing because the growing embryo was too large for the lumen to contain. Additionally, anemia 33 (19.1%) and postoperative fever 15 (6.7%) were this study's most frequent postoperative complications.

The major risk factors identified in this study were previous abortion, PID, a previous history of ectopic pregnancy, and previous tubal surgery. It remains a major challenge to the reproductive performance of women around the globe that increases maternal mortality and morbidity. Attention must be given as it is a pertinent public health issue in our country, Ethiopia.

5. 8 Recommendation

This study was institutional-based, single-centered retrospective research, and a small number of cases were obtained from our study area; thus, it was difficult to conclude for the whole population, which represents the real image of ectopic pregnancy. However, based on my findings, the following recommendations were forwarded:

1. For Hospital

- A high index of clinical suspicion is very important for the early diagnosis of ectopic pregnancy.
- It is important to closely monitor women who have had previous abortions, previous ectopic pregnancy, or previous tubal surgery, and even if they do not exhibit any

symptoms, they should always get counseling regarding the potential hazards of an ectopic pregnancy.

- Mobilize health professionals to give health information on the signs and symptoms of ectopic pregnancy and about the risk factors of ectopic pregnancy.

2. For Policymakers

- Promoting antenatal care services for timely detection of ectopic pregnancy, screening, and early intervention of risk factors of ectopic pregnancy (STIs, PID) to decrease the incidence of ectopic pregnancy.

3. For Researcher

- Further research is needed to explore the relationship between blood group and ectopic pregnancy.
- Further research is needed to assess why ectopic pregnancy is most dominant in the right fallopian tube.
- A large-scale population-based study using primary data to assess all possible risk factors for ectopic pregnancy should be carried out.
  - Generally speaking, improving safe motherhood in women's lives needs inclusive commitments at all levels, at individual levels, at home, in the community, and in the country.
  - To minimize its complications, attention must be given, as it is a pertinent public health issue in our country, Ethiopia.

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10. ANNEX

Consent form

My name is _____. I am a data collector on research working on the Magnitude and management outcome of Ectopic Pregnancy and its associated factors among Pregnant Women Attending Ambo University Referral Hospital, Oromia Regional State, Ethiopia. The information that we collect will help policymakers and other stakeholders to plan and intervene in ectopic pregnancy. Privacy will be kept confidential and will not be shared with anyone.

English version checklist.

Part I Socio-demographic characteristics

Code	Variable	Response	Remark
101	Age	----------in years	
102	Residence	1. Rural 2. Urban	
103	Marital status	1. Married 2. . Widowed 3. Divorced 4. single	
104	Occupation	1. Housewife 2. Government employee 3. Merchant 4. Daily laborer	
105	Educational level	1. Unable to read and write 2. 1-8th grade 3. 9-12th grade 4. College or University	
106	Religion	1. Orthodox 2. Muslim	

		3. Protestant 4. Other/ specify	
107	Ethnicity	1. Oromo 2. Amhara 3. Tigray 4. Guraghe 5. Other/ specify----------	

Part II Clinical presentation and Diagnosis of Ectopic pregnancy

108	What is the chief complaint of the patient?	1. Abdominal pain. 2. Vaginal bleeding. 3. Amenorrhea. 4. Syncope.	
109	What is the type of ectopic pregnancy?	1. Ruptured 2. Unruptured	
110	What is the gestational week?	1. < 7 week 2. 7-9 week 3. > 9 week	
111	How Ectopic pregnancy was diagnosed?	1. Clinical only 2. U/S only 3. Clinical and U/S 4. Clinical and culdocentesis 5. Clinical, culdocentesis and U/S 6. Intraoperative	
112	Urine HCG test result	1. Negative 2. Positive	
113	Hemoglobin level of the patients?	1. < 5g/dl 2. 5g/dl- 10g/dl 3. >10g/dl	
114	Estimated blood lost during the intraoperative process?	1. <500ml 2. 500ml -1000ml 3. 1000ml -1500ml 4. >1500ml	

116	The blood group of the patient	1. A 2. B 3. O 4. Others	

Part III past Obstetrics and surgical History.

No.	Variable	Response	Remark
117	State of pregnancy	1. Intrauterine pregnancy 2. Ectopic pregnancy	
118	If Qno. 9 is Ectopic pregnancy where is the site of pregnancy?	1. Tubal 2. Abdominal 3. Ovarian 4. Cervix 5. Other Specify----------	
119	If Qno10 is tubal where is the site?	1. ampulla 2. isthmus 3. Fimbrie	
120	Do you have a Previous history of Ectopic pregnancy?	1. Yes 2. No	
121	Previous history of abortion?	1. Yes 2. No	
122	If Qno.13 is yes what is the type of abortion?	1. Spontaneous only 2. Induced only 3. Both	
123	If Qno.14 is both how many times spontaneous abortion occurs?	1. 1 2. 2 and above	
124	If Qno. 14 is both how many times induced abortion occurs?	1. 1 2. 2 and above	
125	Previous history of appendectomy	1. Yes 2. No	
126	Previous history of tubal surgery	1. Yes 2. No	

127	Previous history of cesarean section	1. Yes 2. No	
128	Parity	1. 0 2. 1 2. 2 3. 3 4. 4 5. 5 and above	
129	Previous history of recurrent STI/STD	1. Yes 2. No	
130	Previous history of PID		
131	History of infertility	1. Yes 2. No	
132	History of IUCD use	1. Yes 2. No	
133	History of OCP use	1. Yes 2. No	
134	History of injectable contraceptive use	1. Yes 2. No	
135	History of implant		

Part III Behavioral History

No.	Variable	Response	Remark
136	Cigarettes smoking	1. non-smoker 2. Occasional smokers 3. regular smokers	
137	If Yes to 24 how long ago did you start smoking?	----------	
138	If yes to 24, how often were you smoking?	1. Daily 2. Once a week 3. 3 times per week 4. Once a month	
139	The number of cigarettes used?	----------	
140	A history of alcohol drinking?	1. Yes	

		2. No	
141	If Yes to Q28 How often do you have a drink containing alcohol?	1. Less than monthly 3. 2-4 times a month 3. 2-4times a week 4. 4/more times a week	
142	Outcome of ectopic pregnancy?	1. Favorable 2. Unfavorable	

Thank you very much for your participation!