Epidemiology, Risk Factors, and Management Strategies of Ectopic Pregnancy: A Retrospective Study

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Abstract

Background: Ectopic pregnancy remains a significant cause of maternal morbidity and mortality worldwide. This study examines the incidence, risk factors, clinical presentation, and management of ectopic pregnancy at a tertiary care hospital in Saudi Arabia.

Methods: A retrospective analysis was conducted on 154 women diagnosed with ectopic pregnancy at Khamis Mushayet Obstetrics and Gynecology Hospital between 2020 and March 2025. Data on demographic characteristics, clinical presentation, risk factors, diagnostic methods, and pregnancy outcomes were collected from medical records.

Results: The annual incidence of ectopic pregnancy ranged from 0.75 to 1.52 per 100 live births, peaking in 2022. Most cases (42.9%) occurred in women aged 31–40 years, with high proportions of overweight (27.9%) and obese (25.3%) patients. The majority (82.5%) were tubal pregnancies, while 9.7% were ovarian and 7.8% occurred at other sites. Common risk factors included spontaneous pregnancy(41.6%),priorabortion(47.4%),andcesarean section (13.6%). Vaginal bleeding (74.0%) and abdominal pain (66.9%) were the most frequent symptoms. Diagnosis primarily relied on β-hCG testing (92.2%) and transvaginal ultrasound (63.0%). Rupture occurred in 20.1% of cases, but only 0.6% presented with hemodynamic instability.

Conclusion: This study highlights the demographic and clinical profile of ectopic pregnancy in a Saudi population, emphasizing the need for early diagnosis and risk factor awareness. The findings support improved prenatal care and targeted health education to reduce complications. Further multicenter studies are recommended to validate these results nationally.

Keywords:
Ectopic pregnancy, Saudi Arabia, risk factors, clinical presentation, maternal health.

Introduction

Ectopic pregnancy is a potentially life-threatening condition in which a fertilized egg implants and grows outside the uterine cavity, most commonly in the fallopian tube (tubal pregnancy) [1]. Rarely, implantation may occur in other sites such as the ovary, cervix, or abdominal cavity [2]. Since these locations cannot support a growing embryo, ectopic pregnancies are non-viable and pose serious risks to the mother, including rupture, severe hemorrhage, and even death if untreated [3].

The abnormal implantation is mainly attributed to factors that disrupt the normal transport of the egg towards the uterus. Tubal damage, often resulting from pelvic inflammatory disease (PID) caused by sexually transmitted infections [4], prior tubal surgeries [5], or endometriosis [6], creates physical obstructions or alters tubal function. These obstructions impair the egg's movement, leading to implantation within the tube itself. Additionally, abnormal tubal motility, influenced by hormonal imbalances or previous infections, can impede the egg's progression. While intrauterine devices (IUDs) generally prevent pregnancy, those that do occur in their presence are more likely to be ectopic [7]. Assisted reproductive technologies (ART), smoking, a history of ectopic pregnancy, and congenital tubal abnormalities also contribute to the risk [8, 9]. As the ectopic pregnancy progresses, the fallopian tube, ill-equipped for embryonic development, can rupture, resulting in severe internal haemorrhage [10].

Early diagnosis through clinical evaluation, ultrasound, and beta-human chorionic gonadotropin (β-hCG) monitoring is crucial to prevent complications [11, 12]. Treatment options include medical management with methotrexate or surgical intervention, depending on the patient's condition [13, 14]. Recognizing symptoms such as abdominal pain, vaginal bleeding, and signs of shock is essential for prompt medical care [15]. Ectopic pregnancy remains a leading cause of maternal morbidity and mortality in the first trimester, highlighting the need for delicate awareness and appropriate intervention [16]. This study aims to evaluate the incidence, identify the risk factors, and assess the management strategies and outcomes of ectopic pregnancy among women at Khamis Mushayet Obstetrics and Gynaecology Hospital from 2020 to 2025.

Methodology

This study was a retrospective, record-based analysis conducted at Khamis Mushayet Obstetrics and Gynaecology Hospital, aimed at examining the risk factors, clinical presentation, management, and outcomes of ectopic pregnancy. The study reviewed all cases of ectopic pregnancy from 2020 to March 2025, utilizing data extracted from patient records. The data were extracted from the hospital's electronic medical records system. Relevant patient information was accessed by reviewing case files that included demographic data, clinical presentation, diagnostic tests, risk factors, management methods, and outcomes of ectopic pregnancies. A standardized data extraction form was used to ensure consistency across all records reviewed. All women diagnosed with ectopic pregnancy at Khamis Mushayet Obstetrics and Gynaecology Hospital between 2020 and March 2025 were included in the study. The inclusion criteria included cases where the diagnosis of ectopic pregnancy was confirmed through clinical findings, ultrasound imaging, and/or surgical intervention. Only cases where the full medical records were available for review were included. Cases were excluded from the study if the diagnosis of ectopic pregnancy was uncertain, or if patient records were incomplete or inaccessible. To ensure the accuracy and reliability of the data extracted from patient files, several measures were implemented. First, a pilot data extraction was conducted on a small sample of records to refine the data extraction form and ensure clarity in the variables being recorded. The data extraction process was performed by two independent researchers who followed a standardized protocol, and any discrepancies between the two were resolved through discussion and consultation with a senior researcher.

Data analysis

Data analysis was performed using SPSS version 27 (IBM Corp, 2019). Descriptive statistics were used to summarize the demographic characteristics, clinical profiles, risk factors, and management strategies of the women with ectopic pregnancy. Continuous variables were described using means and standard deviations, while categorical variables were presented as frequencies and percentages. To assess relationships between categorical variables, cross-tabulation was used. This method allowed for the assessment of the distribution of risk factors, complications, and other clinical characteristics across various groups, such as age, type of ectopic pregnancy, and management methods. The chi-square test was used to determine the statistical significance of these relationships, with p-values set at <0.05 for significance. Exact probability tests were applied where appropriate to account for small sample sizes in some categories.

Results

A total of 154 women with ectopic pregnancy were included during the period from 2020 to March 2025. Regarding the annual incidence % of ectopic pregnancy in the study setting (Figure 1), it ranged from 0.75 / 100 live births in 2020 to 1.52 / 100 live births in 2022, 1.28 / 100 live births in 2024, and dropped to 1 / 100 live births in 2025.

The table presents the bio-demographic characteristics and clinical profile of pregnant women diagnosed with ectopic pregnancy at Khamis Mushayet Obstetrics and Gynaecology Hospital. Among the participants, the majority (42.9%) were aged between 31-40 years, with 66 women (No = 66, 42.9%) in this age group. The least represented group was those over 40 years, accounting for 10.4% (No = 16). In terms of body mass index, overweight women made up 27.9% (No = 43), and morbid obesity was seen in 25.3% (No = 39) of the women.

Regarding the number of pregnancies, the largest group was those with 2-4 pregnancies, comprising 46.8% (No = 72). Nulliparous women, with no previous live births, represented 33.1% (No = 51) of the sample, while 47.4% (No = 73) of the participants had a history of abortion, with the majority (83.6%, No = 61) having experienced 1-2 abortions. Additionally, the intake of folic acid was reported by only 5.8% (No = 9) of the women, indicating a potential gap in prenatal care practices.

Figure 2 illustrates the risk factors associated with ectopic pregnancy among cases at Khamis Mushayet Obstetrics and Gynaecology Hospital. The most prevalent risk factor was spontaneous pregnancy, accounting for 41.6% (N = 64) of the cases. Other factors included a history of spontaneous abortion (14.9%, N = 23) and a history of caesarean section (13.6%, N = 21). Additionally, 18.8% (N = 29) of the cases were categorized as idiopathic, meaning no identifiable risk factor was present. Smaller proportions of women had a history of previous ectopic pregnancy (7.8%, N = 12), pelvic surgery (7.1%, N = 11), or tubal surgery (0.6%, N = 1). The table also highlights that the use of intrauterine contraceptive devices (IUCD) was linked to 3.2% (N = 5) of cases. Other risk factors, including in vitro fertilization (IVF), congenital uterine defects, and appendicitis complicated by peritonitis, were present in lower percentages.

Table 2 clarifies the distribution of ectopic pregnancies according to the location of implantation, clinical presentation, and diagnostic tests at Khamis Mushayet Obstetrics and Gynaecology Hospital. The majority of ectopic pregnancies (82.5%, N = 127) were located in the fallopian tube, followed by ovarian ectopic pregnancies (9.7%, N = 15), and other locations (isthmus, cervical, and at scar site) (7.8%, N = 12). Ruptured ectopic pregnancies were observed in 20.1% (N = 31) of cases. Regarding clinical symptoms, vaginal bleeding was the most common symptom at presentation, reported in 74.0% (N = 114) of cases, while abdominal pain was noted in 66.9% (N = 103). Amenorrhea was present in 7.1% (N = 11), and a small number of cases (3.2%, N = 5) reported no symptoms. Hemodynamic instability, indicating a more severe presentation, was seen in only 0.6% (N = 1) of the cases. For diagnosis, the most frequently used test was the B-human chorionic gonadotropin (b-hCG) level, which was conducted in 92.2% (N = 142) of cases, followed by transvaginal ultrasonography (TVU) in 63.0% (N = 97), and transabdominal ultrasound in 55.8% (N = 86). Laparoscopy, a more invasive diagnostic method, was used in only 2.6% (N = 4) of cases.

Table 3 outlines the various management strategies and outcomes for ectopic pregnancy cases at Khamis Mushayet Obstetrics and Gynaecology Hospital. The most common approach to management was methotrexate treatment, used in 40.9% (N = 63) of cases, followed by surgical intervention in 35.1% (N = 54). Observation alone was used in 18.2% (N = 28) of cases. Regarding medical management, single-dose methotrexate was the most commonly used, in 39.6% (N = 61), with double-dose methotrexate used in 7.1% (N = 11). For surgical management, 26.0% (N = 40) underwent laparotomy and 14.3% (N = 22) had laparoscopy. Only 0.6% (N = 1) had an evacuation and curettage (E&C) procedure. The preferred surgical method was salpingectomy, performed in 95.2% (N = 60) of surgeries, with segmental resection conducted in 4.8% (N = 3). As for complications, the majority of cases (93.5%, N = 144) had no complications. However, 5.8% (N = 9) experienced bleeding, and a small number (0.6%, N = 1) reported abdominal pain.

Table 4 shows the distribution of ectopic pregnancy risk factors by women's age. For women aged 18-25, the highest risk factors were spontaneous pregnancy (44.1%, N = 15) and idiopathic (26.5%, N = 9). Among women aged 26-30, spontaneous pregnancy remained the most common risk factor (52.6%, N = 20), followed by history of spontaneous abortion (15.8%, N = 6). In the 31-40 age group, the two highest risk factors were spontaneous pregnancy (34.8%, N = 23) and history of spontaneous abortion (15.2%, N = 10). For women over 40 years, the most prominent risk factor was previous ectopic pregnancy (31.3%, N = 5), followed by history of spontaneous abortion (25.0%, N = 4). These differences were not statistically significant (p-value of 0.119).

Table 5 reveals the distribution of ectopic pregnancy risk factors by type of ectopic pregnancy. For fallopian tube ectopic pregnancies, spontaneous pregnancy was the most common risk factor, accounting for 44.1% (N = 56), followed by idiopathic causes at 17.3% (N = 22). Among ovarian ectopic pregnancies, history of spontaneous abortion (20.0%, N = 3) was the most common risk factor, followed by history of caesarean section at 13.3% (N = 2). For other ectopic pregnancy locations, spontaneous pregnancy was also a prominent factor, accounting for 33.3% (N = 4), while idiopathic causes were observed in 16.7% (N = 2).

Table 6 presents the complications associated with ectopic pregnancy by the type of implantation location. For fallopian tube ectopic pregnancies, a small percentage of cases experienced complications: abdominal pain was reported in 0.8% (N = 1) of cases, and bleeding occurred in 7.1% (N = 9). No complications were observed in cases of ovarian or other ectopic pregnancy types, as all cases in these categories (100%, N = 15 for ovarian and N = 12 for others) did not report complications (P=.686).

Figure 1. The annual incidence % of ectopic pregnancy during the period from 2020 to 2025 in Khamis Mushayet Obstetrics and Gynaecology Hospital

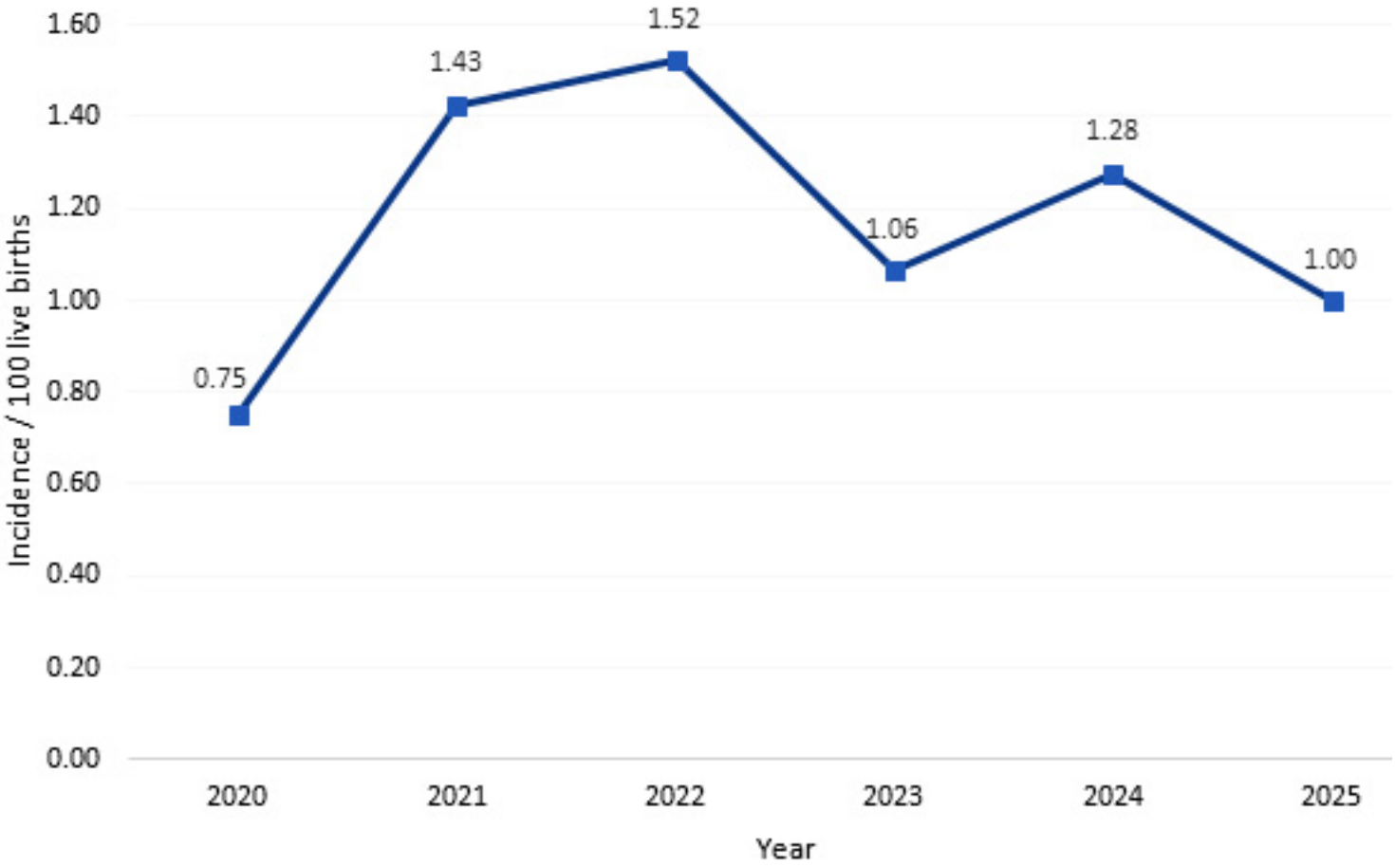

Table 1: Bio-demographic Characteristics of Pregnant Women with Ectopic Pregnancy at Khamis Mushayet Obstetrics and Gynaecology Hospital, Saudi Arabia (N=154)

Data	No	%
Age in years		
18-25	34	22.1%
26-30	38	24.7%
31-40	66	42.9%
> 40	16	10.4%
Mean ± SD	30.4 ± 6.8	
Body mass index		
Normal	42	27.3%
Overweight	43	27.9%
Obese	30	19.5%
Morbid obesity	39	25.3%
Number of Pregnancies		
Primigravida	42	27.3%
2-4	72	46.8%
5+	40	26.0%
Mean ± SD	3.5 ± 2.6	
Number of Live births		
Nullipara	51	33.1%
Primipara	36	23.4%
2-3	42	27.3%
4+	25	16.2%
Mean ± SD	1.7 ± 1.3	
History of abortion		
Yes	73	47.4%
No	81	52.6%
Number of abortions (n=73)		
1-2	61	83.6%
3+	12	16.4%
Drug intake		
Folic acid	9	5.8%
No	145	94.2%

Figure 2: Risk Factors of Ectopic Pregnancy among Cases at Khamis Mushayet Obstetrics and Gynaecology Hospital, Saudi Arabia (N=154)

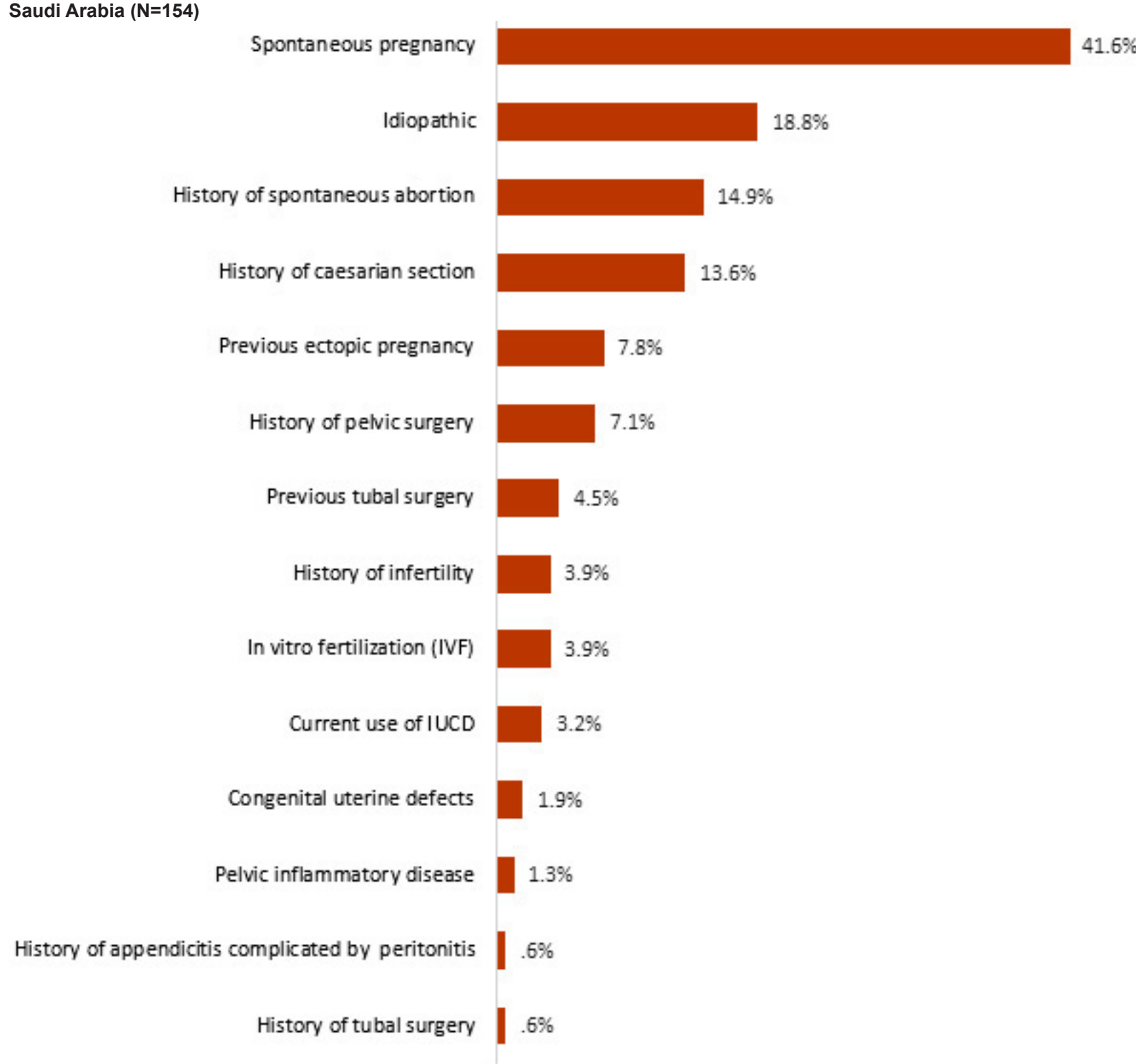

Table 2. Types, Symptoms, and Diagnostic Findings of Ectopic Pregnancy at Khamis Mushayet Obstetrics and Gynaecology Hospital, Saudi Arabia

Data	No	%
Types according to the location of implantation		
Fallopian tube	127	82.5%
Ovarian	15	9.7%
Others	12	7.8%
Rupture ectopic		
Yes	31	20.1%
No	123	79.9%
Symptoms at presentation		
Bleeding per vagina	114	74.0%
Pain abdomen	103	66.9%
Amenorrhea	11	7.1%
None	5	3.2%
Hemodynamics unstable	1	.6%
Diagnostic tests		
B-human chorionic gonadotropin (b-hCG) level	142	92.2%
Transvaginal ultrasonography (TVU)	97	63.0%
Trans abdominal US	86	55.8%
Laparoscopic	4	2.6%

Table 3. Management Approaches and Outcomes for Ectopic Pregnancy at Khamis Mushayet Obstetrics and

Management	No	%
Method of management		
Methotrexate	63	40.9%
Surgery	54	35.1%
Observation	28	18.2%
Combined	9	5.8%
Medical management		
None	82	53.2%
Single dose methotrexate	61	39.6%
Double dose methotrexate	11	7.1%
Surgical management		
None	91	59.1%
Laparotomy	40	26.0%
Laparoscopy	22	14.3%
E and C	1	.6%
Type of Surgery		
Salpingectomy	60	95.2%
Segmental resection	3	4.8%
Complications		
No	144	93.5%
Bleeding	9	5.8%
Abdominal pain	1	.6%

Table 4. Distribution of ectopic pregnancy risk factors by women's age, Khamis Mushayet Obstetrics and Gynaecology Hospital

Risk factors	Age in years								p-value
	18-25		26-30		31-40		> 40		
	No	%	No	%	No	%	No	%	
Pelvic inflammatory disease	0	0.0%	1	2.6%	1	1.5%	0	0.0%	.119
History of tubal surgery	0	0.0%	0	0.0%	1	1.5%	0	0.0%	
History of pelvic surgery	2	5.9%	2	5.3%	7	10.6%	0	0.0%	
In vitro fertilization (IVF)	0	0.0%	1	2.6%	5	7.6%	0	0.0%	
History of spontaneous abortion	3	8.8%	6	15.8%	10	15.2%	4	25.0%	
Congenital uterine defects	0	0.0%	0	0.0%	3	4.5%	0	0.0%	
History of infertility	1	2.9%	0	0.0%	5	7.6%	0	0.0%	
Current use of IUCD	0	0.0%	0	0.0%	5	7.6%	0	0.0%	
History of Cesarean Section	4	11.8%	4	10.5%	11	16.7%	2	12.5%	
Spontaneous pregnancy	15	44.1%	20	52.6%	23	34.8%	6	37.5%	
The history of appendicitis complicated by peritonitis	0	0.0%	0	0.0%	1	1.5%	0	0.0%	
Previous ectopic pregnancy	0	0.0%	3	7.9%	4	6.1%	5	31.3%	
Idiopathic	9	26.5%	6	15.8%	12	18.2%	2	12.5%	
Previous tubal surgery	3	8.8%	1	2.6%	2	3.0%	1	6.3%	

P: exact probability test

Table 5. Distribution of ectopic pregnancy risk factors by type of ectopic pregnancy, Khamis Mushayet Obstetrics and Gynaecology Hospital

Risk factors	Types according to the location of implantation						p-value
	Fallopian tube		Ovarian		Others		
	No	%	No	%	No	%	
Pelvic inflammatory disease	1	.8%	0	0.0%	1	8.3%	
History of tubal surgery	1	.8%	0	0.0%	0	0.0%	
History of pelvic surgery	9	7.1%	1	6.7%	1	8.3%	
In vitro fertilization (IVF)	4	3.1%	1	6.7%	1	8.3%	
History of spontaneous abortion	18	14.2%	3	20.0%	2	16.7%	
Congenital uterine defects	2	1.6%	0	0.0%	1	8.3%	
History of infertility	6	4.7%	0	0.0%	0	0.0%	.730
Current use of IUCD	5	3.9%	0	0.0%	0	0.0%	
History of Cesarean Section	18	14.2%	2	13.3%	1	8.3%	
Spontaneous pregnancy	56	44.1%	4	26.7%	4	33.3%	
The history of appendicitis complicated by peritonitis	1	.8%	0	0.0%	0	0.0%	
Previous ectopic pregnancy	11	8.7%	1	6.7%	0	0.0%	
Idiopathic	22	17.3%	5	33.3%	2	16.7%	
Previous tubal surgery	4	3.1%	1	6.7%	2	16.7%	

P: exact probability test

Table 6. Complications Associated with Ectopic Pregnancy by Type of Implantation Location at Khamis Mushayet Obstetrics and Gynaecology Hospital, Saudi Arabia

Types according to the location of implantation	Complications						p-value
	Abdominal pain		Bleeding		No		
	No	%	No	%	No	%	
Fallopian tube	1	.8%	9	7.1%	117	92.1%	.686
Ovarian	0	0.0%	0	0.0%	15	100.0%	
Others	0	0.0%	0	0.0%	12	100.0%	

P: exact probability test

Discussion

The study included 154 women diagnosed with ectopic pregnancy between 2020 and March 2025, revealing fluctuations in annual incidence rates. The rate increased from 0.75 per 100 live births in 2020 to a peak of 1.52 in 2022, then declined to 1.28 in 2024 and further to 1.0 in 2025. This pattern matches global trends showing variability in ectopic pregnancy rates, possibly influenced by changes in risk factors such as pelvic inflammatory disease (PID), previous tubal surgery, or assisted reproductive technologies (ART) [17]. The rise in incidence up to 2022 may reflect improved diagnostic techniques, such as transvaginal ultrasound and serial beta-hCG monitoring, leading to earlier detection [18]. However, the subsequent decline could be attributed to better preventive measures, including increased screening and treatment for sexually transmitted infections (STIs), which are major contributors to tubal damage [19]. The findings are consistent with studies reporting ectopic pregnancy rates between 1% and 2% of live births in different populations [20]. The drop in 2025, though is based on partial-year data.

The incidence of ectopic pregnancy in Saudi Arabia appears to be lower than in many Western countries but is increasing, possibly due to changing risk factors. Studies from Saudi Arabia report an incidence ranging from 0.8 to 1.2 per 100 live births [21, 22], which is slightly lower than rates in the United States (1.5–2.0 per 100 live births) and Europe (1.0–1.5 per 100 live births) [8, 23]. In Abha, Archibong et al. [24] reported the incidence of ectopic pregnancy was 0.74 per 100 live births, which is similar to our study findings on average. However, regional variations exist within Saudi Arabia, with higher rates observed in urban areas, possibly due to better diagnostic capabilities and increased risk factors such as pelvic inflammatory disease (PID) and caesarean section rates [22, 25]. The rising trend in Saudi Arabia could be linked to increased use of assisted reproductive technologies (ART) and delayed childbearing, similar to patterns seen in developed nations [26].

Our study also revealed that the majority of cases were aged 31–40 years, consistent with global studies linking advanced maternal age to higher ectopic pregnancy risk due to age-related tubal dysfunction and increased use of assisted reproductive technologies (ART) [23]. Only a few cases were over 40, possibly reflecting lower pregnancy rates in this age group. A significant proportion of women were overweight or morbidly obese, consistent with research suggesting obesity as a risk factor for ectopic pregnancy, possibly due to hormonal imbalances or chronic inflammation [27]. The high percentage of women with 2–4 previous pregnancies and a history of abortion supports evidence that multiparity and prior abortions (particularly surgical) increase tubal damage and ectopic risk [19]. The considerable number of nulliparous women highlights that ectopic pregnancy can occur even without prior live births, often associated with infertility, PID, or undiagnosed tubal pathology [28]. Worryingly, only 5.8% reported folic acid intake, suggesting inadequate preconception care, though folic acid's direct role in ectopic prevention remains unclear [29].

Regarding risk factors, the current study found that spontaneous pregnancies were the most frequently associated factor with ectopic pregnancies, consistent with global observations, but a substantial number of cases also involved prior spontaneous abortions and caesarean sections, suggesting possible connections to tubal damage or altered uterine anatomy [23, 30, 31]. A significant portion of ectopic pregnancies occurred without identifiable risk factors. The occurrence of prior ectopic pregnancies was lower compared to Western studies, potentially reflecting regional differences. Tubal ligation was infrequently associated, despite its known role as a risk factor [8]. Intrauterine device use was less frequent than some international reports [32], and assisted reproductive technology, uterine anomalies, and appendicitis with peritonitis were rarely observed.

Additionally, the study confirmed that tubal implantation is the most frequent site of ectopic pregnancy, though a higher-than-expected rate of ovarian ectopic pregnancies was also observed. Non-tubal ectopic pregnancies, including cervical, isthmic, and scar pregnancies, were also noted, consistent with increasing reports of atypical implantations, particularly in women with prior uterine surgery or caesarean sections [33]. The reported rupture rate suggested some diagnostic delays, although severe hemodynamic instability was rare. Vaginal bleeding and abdominal pain were the most common presenting symptoms, but a small proportion of cases lacked typical pregnancy symptoms or were asymptomatic, indicating the need for screening high-risk individuals. Beta-hCG testing was appropriately prioritized for diagnosis, and transvaginal ultrasound was favoured over transabdominal ultrasound due to its superior sensitivity [34, 35]. Laparoscopy was infrequently used, suggesting effective non-invasive diagnostic protocols, although it remains the gold standard for uncertain cases [36].

Strengths and limitations

This study provides important insights into the clinical and demographic characteristics of ectopic pregnancies at a major Saudi Arabian hospital, but several limitations must be acknowledged when interpreting the findings. As a single-centre study conducted at Khamis Mushayet Hospital, the results may not fully reflect the broader population across different regions of Saudi Arabia. The retrospective design introduces potential biases from incomplete medical records and inconsistent documentation of risk factors. The relatively short five-year study period (2020-2025) may be insufficient to identify long-term trends in ectopic pregnancy incidence and associated factors. Diagnostic challenges are another limitation, as some early ectopic pregnancies might have been missed if they resolved spontaneously before detection, while variations in ultrasound interpretation and β-hCG testing protocols could affect case classification accuracy.

Conclusions and Recommendations

In conclusion, the prominence of spontaneous pregnancy as a risk factor was reported, particularly among women aged 26-30, and the influence of previous spontaneous abortions and caesarean sections. Most ectopic pregnancies occurred in the fallopian tube, with abdominal pain and bleeding as common symptoms. Methotrexate was the primary management approach, followed by surgical options. While most cases were successfully managed without severe complications, a gap in prenatal care was identified due to low folic acid intake. Recommendations include enhancing prenatal education about folic acid benefits, improving screening for high-risk women, increasing follow-up for those with prior ectopic pregnancies, and conducting further research on obesity and BMI as potential risk factors.

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