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Prevalence and factors associated with ectopic pregnancy: A cross-sectional study in the Maternity and Children's Hospital in Al Hasa, Saudi Arabia

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Abstract

Background: Ectopic pregnancy (EP) is a significant cause of maternal morbidity and mortality worldwide. Limited data on the prevalence and associated risk factors of EP in Saudi Arabia are available. This study aims to bridge this gap by evaluating the demographic, clinical, and risk factor profiles of women diagnosed with EP at the Maternity and Children's Hospital (MCH), Al Hasa.

Objective: To determine the prevalence of EP, identify associated risk factors, and evaluate diagnostic methods and management approaches for EP in Al Hasa, Saudi Arabia, from January 2018 to April 2021.

Methods: A retrospective cross-sectional study analyzed the medical records of 135 women diagnosed with EP. Data on demographics, clinical profiles, and associated risk factors were collected. Statistical analysis was performed using SPSS, with a p-value of <0.05 considered significant.

Results: The prevalence of EP was highest among women aged 30–39 years (42.2%). Key risk factors included spontaneous pregnancy (42%), history of spontaneous abortion (18%), and cesarean sections (14%). Fallopian tube implantation was the most common type (85.3%). β-hCG levels were used in 94.8% of diagnoses and transvaginal ultrasonography in 66.7%. Management primarily involved single-dose methotrexate (27.4%). Complications included rupture in 20% of cases, with bleeding per vagina being the most reported symptom (74.8%).

Conclusion: The study highlights the significant prevalence of EP and associated risk factors in Al Hasa. Improved awareness, early diagnosis, and effective management strategies are essential to mitigate complications and enhance maternal health outcomes.

Keywords: Ectopic Pregnancy; Prevalence; Risk Factors; Diagnosis; Management.

1. Introduction

Ectopic pregnancy (EP) is a critical medical condition with potentially life-threatening implications, characterized by the implantation of a fertilized ovum outside the endometrial lining of the uterine cavity (1). EP is classified based on its implantation site, with approximately 98% occurring in the fallopian tubes. Of these, 80% are ampullary, 12% isthmic, 6% fimbrial, 2% cornual, 1-2% abdominal, less than 1% ovarian, and 0.15% cervical. Rarely, EP can co-occur with heterotopic pregnancy. Accurate classification is essential for effective diagnosis and management (2).

Globally, EP has an incidence rate of 1-3% and contributes to maternal mortality rates of up to 15% (3). During the first trimester, complications related to pregnancy account for maternal mortality rates of 4-10% (4). Notably, ruptured ectopic pregnancies are responsible for 10-15% of maternal deaths (5).

In Washington State, USA, a decline in hospitalized cases of EP was observed between 1987 and 2014. However, mortality and severe morbidity rates increased from 3.85% to 19.63% among women aged 25 to 34 years during this period (6). Timely intervention following symptom onset significantly impacts clinical outcomes and maternal mortality rates (7). Common symptoms of EP include amenorrhea, abdominal pain, and vaginal bleeding, which may mimic those of miscarriage or abortion. Thus, immediate ultrasonographic evaluation is vital for accurate differentiation and prompt management (8).

Several significant risk factors are associated with EP,

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including pelvic inflammatory disease, salpingitis isthmica nodosa, prior tubal surgery, ovulation induction, progestin contraceptives, in vitro fertilization (IVF), induced abortions, smoking, and diethylstilbestrol exposure (9, 10). Demographic studies reveal that Black women have nearly double the incidence of EP compared to White women and face a fourfold higher mortality risk (11).

A study in Pakistan identified contraceptive use (30%), genital tract infection history (22.2%), previous EP (12%), and prior tubal surgery (5.1%) as prevalent risk factors among women diagnosed with EP (10). Early detection methods, such as quantitative β-HCG measurements, transvaginal ultrasonography (TVU), and laparoscopy, are critical for effective management (12, 13). Methotrexate treatment following early diagnosis has preserved tubal patency (14).

Between 2006 and 2013, the incidence of EP in the United States rose from 11 to 13.7 cases per 1,000 live births, reflecting a steady increase. From 2006 to 2010, this rate climbed from 7 to 8.3 cases per 1,000 live births, indicating a consistent upward trend (15). Similarly, Saudi cities like Makkah and Yanbu Industrial City have reported EP prevalence rates of 0.58% and 1.13%, respectively (16, 17).

While significant attention has been given to EP in Western countries, research in Saudi Arabia remains limited. Studies in the region primarily focus on risk factors such as pelvic inflammatory disease, intrauterine contraceptive devices (IUCD), prior tubal surgery, and previous ectopic pregnancies. However, these studies fail to comprehensively address the broader spectrum of risk factors, particularly obstetric histories, associated with EP. This study addresses this gap by investigating the prevalence of EP and evaluating critical risk factors among pregnant women in Saudi obstetric settings, utilizing data collected from January 2018 to April 2021. Findings from this research aim to enhance the early diagnosis and management of EP, thereby reducing complications and improving maternal health outcomes.

This study aims to investigate the prevalence of ectopic pregnancy and examine the significance of associated risk factors among pregnant women in Al Hasa between January 2018 and April 2021. Specifically, it seeks to determine the prevalence of ectopic pregnancy during the study period and analyze the demographic, clinical, and obstetric profiles of affected women—including factors such as age, residence, BMI, multivitamin intake, reproductive history, and gestational age at presentation—and evaluate the contribution of various risk factors, such as pelvic inflammatory disease, history of surgical interventions, infertility treatments, contraceptive use, and other gynecological or obstetric conditions. Furthermore, the study explores the relationship between the profiles of affected women and these risk factors while also addressing secondary objectives, including mortality and morbidity rates, the most common types of ectopic pregnancy, diagnostic methods, β-hCG levels at presentation, and the prevalent management approaches used during this period.

2. Methodology

2.1. Study Setting

This research was conducted at the Maternity and Children's Hospital (MCH) in Al Hasa, Eastern Province, Saudi Arabia. MCH operates under the Ministry of Health and provides specialized care for mothers and children, offering comprehensive healthcare services with a capacity of 450 beds.

2.2. Study Design

A retrospective cross-sectional study design was employed to analyze all cases of ectopic pregnancy (EP) admitted to MCH. The study aimed to explore the clinical characteristics and outcomes associated with EP, which contribute to the advancement of knowledge in this area.

2.3.Study Population and Eligibility Criteria

The study included all EP cases admitted to MCH between January 2018 and April 2021. Inclusion criteria required participants to be Saudi residents or citizens aged 18–50 years and diagnosed with an emergency case of EP. Exclusion criteria were patients under 18 or over 50 and cases with unconfirmed EP diagnoses.

2.4. Sample Size Calculation and Sampling

The sample size was determined using the Raosoft sample size calculator. Based on an estimated population of 63,859 (as reported by the hospital's statistical office) and an expected response rate of 50%, a sample size of 379 was calculated to achieve a 95% confidence level and a margin of error of 5%.

2.5. Sampling Technique

A convenience sampling approach was utilized to recruit retrospective cases for the study. This technique enabled the selection of readily accessible cases that met the eligibility criteria.

2.6. Data Collection Procedure

Data were collected retrospectively using an online form created in Google Forms. Three trained research assistants extracted patient information from hospital records under the supervision of the research team. Ethical approval was obtained from the Institutional Review Board (IRB), and formal permission was secured from the hospital management before initiating the data collection process.

Collected data included demographic information such as age, education level, residence, and body mass index (BMI) and reproductive history details like the number of pregnancies, deliveries, live births, stillbirths, and gestational age at presentation. The study also documented risk factors, including pelvic inflammatory disease, salpingitis isthmica nodosa, tubal or pelvic surgery history, ovulation induction, in vitro fertilization, induced and spontaneous abortions, smoking, diethylstilbestrol exposure, congenital uterine anomalies, and contraceptive usage.

2.7. Data analysis

Following data collection, the information was cleaned, coded, and entered into IBM SPSS software version 22 (SPSS Inc., Chicago, IL) for statistical analysis. Two-tailed tests were performed, with a p-value of <0.05 considered statistically significant. Descriptive analysis summarized frequencies and percentages for demographic characteristics, obstetric and gynecological histories, EP risk factors, clinical presentations, management strategies, and associated complications. Cross-tabulations were employed to examine the distribution of EP profiles and related risk factors among participants. Exact tests were utilized to determine statistical significance for variables with low-frequency distributions.

3. Results

Table 1 shows that a total of 135 women with ectopic pregnancy were included in the study. The ages of the women ranged from 18 to 47 years, with a mean age of 30.6 ± 6.6 years. A majority of the women were from Al Hufof (43%), followed by Al Mubaraz (42.2%), Eastern villages (11.9%), and Northern villages (3%). Regarding body mass index (BMI), 27.4% of the women had normal weight, 28.9% were overweight, 20% were classified as obese, and 23.7% had morbid obesity. Regarding pregnancy history, 23.7% of the women were pregnant for the first time, 48.1% had experienced 2-4 pregnancies, and 28.1% had five or more pregnancies. Concerning the number of live births, 31.1% had no live births, 23% had one live birth, 28.9% had 2 to 3 live births, and 17% had four or more live births. Regarding stillbirth history, 50.4% of the women had no prior stillbirths, 40.7% had 1-2 stillbirths, and 8.9% had three or more stillbirths. Additionally, only

Table 1: Bio-demographic data & profile of pregnant women with ectopic pregnancy at MCH, January 2018 to April 2021.

Bio-demographic data	Frequency	Percent (%)
Area of residence		
Al Hufof	58	43.0%
Al Mubaraz	57	42.2%
Eastern villages	16	11.9%
Northern villages	4	3.0%
Age in years		
< 25	28	20.7%
25-29	35	25.9%
30-39	57	42.2%
40+	15	11.1%
Body mass index		
Normal	37	27.4%
Overweight	39	28.9%
Obese	27	20.0%
Morbid obesity	32	23.7%

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Cont. Table 1

Bio-demographic data	Frequency	Percent (%)
Number of Pregnancy		
Primigravida	32	23.7%
2-4	65	48.1%
5+	38	28.1%
Number of Live births		
Nullipara	42	31.1%
Primipara	31	23.0%
2-3	39	28.9%
4+	23	17.0%
Number of Stillbirths		
None	68	50.4%
1-2	55	40.7%
3+	12	8.9%
Multivitamin intake		
Folic acid	7	5.2%
No	128	94.8%
B-Hcg level in admission		
Range	93.0-10520	
Mean ± SD	2549.4 ± 2198.7	
Median	2121	

5.2% of the women in the study received folic acid.

Figure 1 illustrates the risk factors associated with ectopic pregnancy in the study population. The most frequently reported risk factor was spontaneous pregnancy (42%), followed by a history of spontaneous abortion (18%), a history of cesarean section (14%), pelvic surgery (8%), previous ectopic pregnancy (6%), and in vitro fertilization (IVF). Idiopathic cases accounted for 4% of the total. Notably, 20% of the women had no reported risk factors.

Table 2 shows the clinical profile of ectopic pregnancy among the study women in Al-Hasa, Saudi Arabia. The fallopian tube was the most common site of implantation, accounting for 85.3% of cases, followed by ovarian ectopic pregnancies (8.2%), with other types (i.e., isthmic, cervical, and scar site) being reported in sporadic instances. A total of 27 women (20%) experienced a ruptured ectopic pregnancy. The most frequently reported symptoms were vaginal bleeding (74.8%) and abdominal pain (68.9%), while 6.7% of women reported amenorrhea. Notably, 3% of the women had no clinical symptoms. Regarding diagnostic methods, β-human chorionic gonadotropin (β-hCG) levels were used to diagnose 94.8% of the cases, followed by transvaginal ultrasonography (TVU) (66.7%), transabdominal ultrasound (53.3%), and laparoscopy (2.2%).

Table 3 shows the management methods and complications associated with ectopic pregnancy among women in Al-Hasa, Saudi Arabia. The most commonly reported medical management approach was a single dose of methotrexate, administered to 27.4% of the women. Double doses were given to 3.7% of women; one underwent an evacuation and curettage (E&C). Notably, 68.9% of women did not receive any medical intervention. In terms of surgical management, laparotomy was the most frequent procedure (24.4%), followed by laparoscopy (14.8%), and one case involved E&C. Regarding the type of surgery, salpingectomy was performed on 96.3% of the women, while one case involved segmental resection, and another underwent both left salpingectomy and right stomy. Only two women (0.7%) experienced complications, with one case presenting abdominal pain and the other resulting in

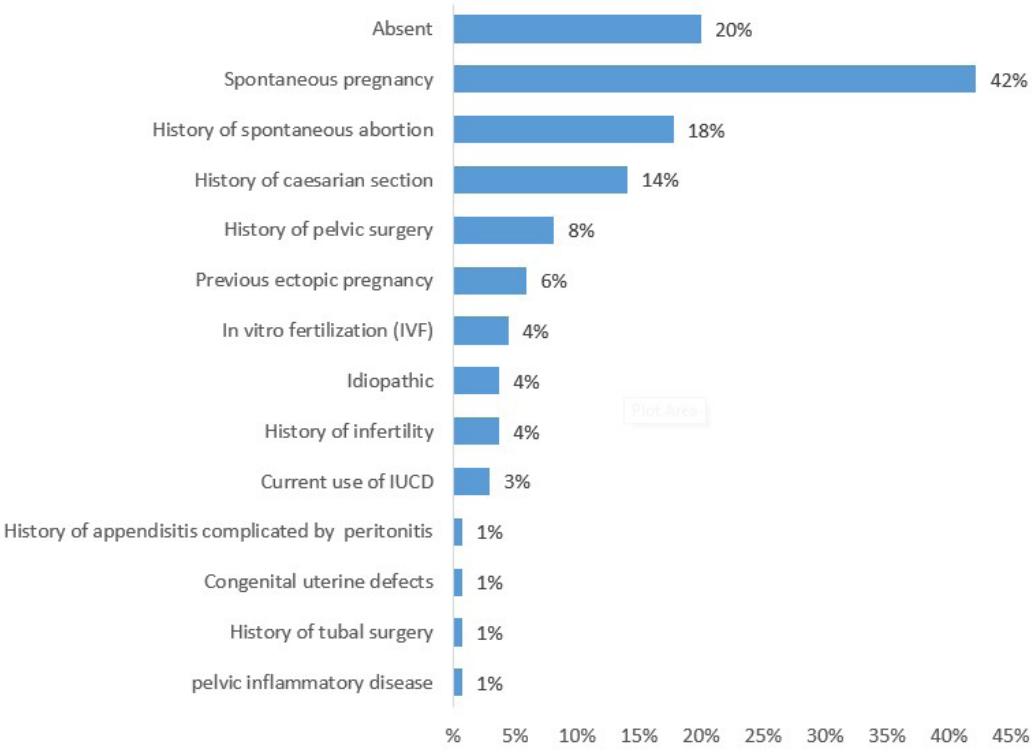

Figure 1:Risk factors of ectopic pregnancy among women with ectopic pregnancy at MCH, January 2018 to April 2021

Table 2: Clinical profile of ectopic pregnancy among study women at MCH, January 2018 to April 2021.

Clinical profile	**Frequency**	**Percent (%)**
Types according to the location of implantation		
Right Fallopian tube	25	41.0%
Left Fallopian tube	27	44.3%
At the site of c/s scar	1	1.6%
Isthmic	1	1.6%
Right Ovarian	3	4.9%
Left Ovarian	2	3.3%
Cervical	1	1.6%
Heterotopic pregnancy	1	1.6%
Not known	75	55.6%
Rupture ectopic		
Yes	27	20.0%
No	108	80.0%
Symptoms at presentation		
Bleeding per vagina	101	74.8%
Pain abdomen	93	68.9%

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Cont. Table 2

Clinical profile	Frequency	Percent (%)
Amenorrhea	9	6.7%
Asymptomatic	4	3.0%
Vomiting	2	1.5%
Hemodynamic unstable	1	0.7%
Back pain	1	0.7%
Diagnostic test		
β-human chorionic gonadotropin (β-hCG) level	128	94.8%
Transvaginal ultrasonography (TVU)	90	66.7%
Trans abdominal ultrasonography	72	53.3%
Laparoscopic	3	2.2%

#: it was unknown among 74 cases

Table 3: Management methods and complications of ectopic pregnancy among women at MCH, January 2018 to April 2021.

Management & Complications	Frequency	Percent (%)
Medical management		
None	93	68.9%
Single dose methotrexate	37	27.4%
Double dose methotrexate	5	3.7%
Surgical management		
Laparotomy	33	24.4%
Laparoscopy	20	14.8%
E and C	1	.7%
None	81	60.0%
Type of Surgery		
Salpingectomy	52	96.3%
Segmental resection	1	1.9%
Both left Salpingectomy and right segmental resection	1	1.9%
Complications		
Abdominal pain	1	.7%
Death	1	.7%
No	133	98.5%

death.

Table 4 shows the distribution of ectopic pregnancy risk factors by age among women in Al-Hasa, Saudi Arabia. For women under 25 years of age, the most reported risk factors were spontaneous pregnancy (46.4%), followed by a history of spontaneous abortion and a history of cesarean section, each accounting for 10.7%. Among women aged 25-29 years, spontaneous pregnancy was the most common risk factor (54.3%), followed by a history of spontaneous abortion (17.1%). In the 30-39 age group, spontaneous pregnancy was reported by 33.3% of women. In contrast, both a history of cesarean section and a history of spontaneous abortion were reported by 17.5% of women in each category. For women aged 40 and above, the most

common risk factors were spontaneous pregnancy (40%) and a history of spontaneous abortion (33.3%). These age-related differences in risk factors were statistically significant (P = 0.048).

Table 4: Distribution of ectopic pregnancy risk factors by women age at MCH, January 2018 to April 2021.

Risk factors	Age in years								p-value
	< 25		25-29		30-39		40+		
	No	%	No	%	No	%	No	%	
Pelvic inflammatory disease	0	0.0%	0	0.0%	1	1.8%	0	0.0%	
History of tubal surgery	0	0.0%	0	0.0%	1	1.8%	0	0.0%	
History of pelvic surgery	2	7.1%	2	5.7%	7	12.3%	0	0.0%	
In vitro fertilization (IVF)	0	0.0%	1	2.9%	5	8.8%	0	0.0%	
History of spontaneous abortion	3	10.7%	6	17.1%	10	17.5%	5	33.3%	
Congenital uterine defects	0	0.0%	0	0.0%	1	1.8%	0	0.0%	.048*
History of infertility	1	3.6%	0	0.0%	4	7.0%	0	0.0%	
Current use of IUCD, 22-spontaneous pregnancy	0	0.0%	0	0.0%	4	7.0%	0	0.0%	
History of caesarean section	3	10.7%	4	11.4%	10	17.5%	2	13.3%	
Spontaneous pregnancy	13	46.4%	19	54.3%	19	33.3%	6	40.0%	
History of appendicitis complicated by peritonitis	0	0.0%	0	0.0%	1	1.8%	0	0.0%	
Previous ectopic pregnancy	0	0.0%	3	8.6%	3	5.3%	2	13.3%	
Idiopathic	2	7.1%	1	2.9%	1	1.8%	1	6.7%	
Absent	7	25.0%	5	14.3%	12	21.1%	3	20.0%	

P: exact probability test; * P < 0.05 (significant).

Table 5 shows the distribution of ectopic pregnancy risk factors by body mass index (BMI) among women in Al-Hasa, Saudi Arabia. Spontaneous pregnancy was the most commonly reported risk factor across all BMI categories, with prevalence rates of 43.2% in women with normal weight, 41% in overweight women, 59.3% in obese women, and 28.1% in those with morbid obesity. A history of spontaneous abortion and a history of cesarean section were also noted as significant risk factors, although no statistically significant differences were observed between the BMI categories (P = 0.229).

Table 5: Distribution of ectopic pregnancy risk factors by women BMI at MCH, January 2018 to April 2021.

Risk factors	Body mass index								P-value
	Normal		Overweight		Obese		Morbid obesity		
	No	%	No	%	No	%	No	%	
Pelvic inflammatory disease	0	0.0%	1	2.6%	0	0.0%	0	0.0%	.229
History of tubal surgery	0	0.0%	1	2.6%	0	0.0%	0	0.0%	
History of pelvic surgery	3	8.1%	1	2.6%	5	18.5%	2	6.3%	
In vitro fertilization (IVF)	3	8.1%	2	5.1%	0	0.0%	1	3.1%	
History of spontaneous abortion	5	13.5%	6	15.4%	8	29.6%	5	15.6%	
Congenital uterine defects	1	2.7%	0	0.0%	0	0.0%	0	0.0%	
History of infertility	2	5.4%	2	5.1%	0	0.0%	1	3.1%	

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Cont. Table 5

Risk factors	Body mass index								P-value
	Normal		Overweight		Obese		Morbid obesity		
	No	%	No	%	No	%	No	%	
Current use of IUCD, 22-Spontaneous pregnancy	0	0.0%	3	7.7%	0	0.0%	1	3.1%	
History of Cesarean section	5	13.5%	9	23.1%	1	3.7%	4	12.5%	
Spontaneous pregnancy	16	43.2%	16	41.0%	16	59.3%	9	28.1%	
History of appendicitis complicated by peritonitis	0	0.0%	1	2.6%	0	0.0%	0	0.0%	
Previous ectopic pregnancy	3	8.1%	2	5.1%	0	0.0%	3	9.4%	
Idiopathic	2	5.4%	0	0.0%	1	3.7%	2	6.3%	
Absent	5	13.5%	6	15.4%	6	22.2%	10	31.3%	

P: exact probability test

Table 6 shows the distribution of ectopic pregnancy risk factors by type of ectopic pregnancy among women in Al-Hasa, Saudi Arabia. Spontaneous pregnancy was the most commonly reported risk factor across all types of ectopic pregnancies, with 46.2% of fallopian tube cases, 40% of ovarian instances, and 50% of other types. A history of spontaneous abortion and a history of cesarean section were also frequently identified. In vitro fertilization (IVF) was reported in 25% of cases with other types of ectopic pregnancies and 20% of ovarian-type cases. However, no statistically significant differences were found across the different ectopic pregnancy types (P = 0.930).

Table 6: Distribution of ectopic pregnancy risk factors by type of ectopic pregnancy at MCH, January 2018 to April 2021.

Risk factors	Types according to the location of implantation						p-value
	Fallopian tube		Ovarian		Others		
	No	%	No	%	No	%	
Pelvic inflammatory disease	0	0.0%	0	0.0%	0	0.0%	.930
History of tubal surgery	1	1.9%	0	0.0%	0	0.0%	
History of pelvic surgery	5	9.6%	0	0.0%	1	25.0%	
In vitro fertilization (IVF)	2	3.8%	1	20.0%	1	25.0%	
History of spontaneous abortion	7	13.5%	1	20.0%	1	25.0%	
Congenital uterine defects	0	0.0%	0	0.0%	0	0.0%	
History of infertility	3	5.8%	0	0.0%	0	0.0%	
Current use of IUCD, 22-Spontaneous pregnancy	3	5.8%	0	0.0%	0	0.0%	
History of caesarean section	9	17.3%	0	0.0%	0	0.0%	
Spontaneous pregnancy	24	46.2%	2	40.0%	2	50.0%	
History of appendicitis complicated by peritonitis	0	0.0%	0	0.0%	0	0.0%	
Previous ectopic pregnancy	4	7.7%	0	0.0%	0	0.0%	
Idiopathic	0	0.0%	0	0.0%	0	0.0%	
Absent	10	19.2%	2	40.0%	1	25.0%	

P: exact probability test

4. Discussion

This chart review study aimed to assess the prevalence and associated risk factors of ectopic pregnancy among pregnant women attending the Tertiary Health Care Center in the Al Ahsa district of Saudi Arabia. The analysis of three years of hospital data revealed an ectopic pregnancy prevalence rate of 1.25%. This prevalence aligns with some international studies, though there are regional variations in the reported rates. For example, a Nigerian study reported a significantly higher prevalence rate of 3.25% among all gynecological admissions (18). Similarly, a study conducted in Ethiopia found a pooled prevalence rate of 3.61% (95% CI: 2.24–4.98, I2 = 89.2%, p < 0.001) for ectopic pregnancy (19). On the other hand, an Indian study reported an incidence of 2.81 per 100 deliveries (20). While a Chinese study showed a decreasing trend in the prevalence of ectopic pregnancy, from 7.60% in 2011 to 4.28% in 2020, with an annual percentage change (APC) of -1.87 (P < 0.05) (21). Another study conducted in China showed a high prevalence of 7.93% for ectopic pregnancy among gynecological admissions (22). The prevalence rate in the current study is almost identical to that of a similar survey conducted in Al Khobar, Saudi Arabia, which reported a prevalence of 1.13% (23).

In terms of age distribution, the women affected by ectopic pregnancy in the present study were between 18 and 47 years old, with a mean age of 30.6 ± 6.6 years. This age range is consistent with findings from other studies. For instance, a Chinese study reported a higher prevalence of ectopic pregnancy among women aged 25 to 34 years (21). In comparison, Indian research identified women aged 26-30 years as the most affected group, with the minimum age of diagnosis being 18 years and the maximum age 40 years (20). A Nigerian study similarly found that ectopic pregnancies were more common among women aged 20 to 25 years, with the mean age of presentation being 28.6 ± 6.6 years (18). In another Saudi study, the mean age of women with ectopic pregnancy was reported as 30.42 ± 6.9 years (23). These findings suggest that ectopic pregnancy tends to occur in women of reproductive age, with a relatively similar age range across different populations.

One of the most significant findings of the present study is the strong association between a history of spontaneous abortion and the occurrence of ectopic pregnancy. This result is consistent with other research that has identified spontaneous abortion as a key risk factor for ectopic pregnancy. For instance, an Iranian study found that women with a prior history of spontaneous abortion had a 1.93% higher chance of developing an ectopic pregnancy (24).

Another key risk factor identified in the present study is a history of cesarean section. Fourteen percent of the women in this study who had previously undergone a cesarean section were found to be significantly more likely to develop ectopic pregnancy. This finding is consistent with the results of an Ethiopian study, where a significant association between cesarean section and ectopic pregnancy was reported (AOR = 3.4; 95% CI: 1.11–10.94) (25). A systematic review and meta-analysis also found that women with cesarean section scars had 7.4 times higher odds of developing an ectopic pregnancy (25). A systematic review and meta-analysis also found that women with cesarean section scars had 7.4 times higher odds of developing an ectopic pregnancy (25). However, a broader systematic review reported a pooled odds ratio (OR) of 1.05 (95% CI: 0.51-2.15) for the association between cesarean section and subsequent ectopic pregnancy (26). This indicates that both high and low BMI may contribute to the risk of ectopic pregnancy, possibly through mechanisms such as hormonal imbalances or altered reproductive system function.

Body Mass Index (BMI) also plays a role in the risk of ectopic pregnancy, with obesity being identified as a significant risk factor in the current study. Women with higher BMI were more likely to experience spontaneous abortion, which in turn increases the risk of ectopic pregnancy. Previous studies have also suggested a relationship between BMI and ectopic pregnancy. For example, a retrospective case-control study found that women with a low BMI (<18.5 kg/m2) had nearly double the risk of developing an ectopic pregnancy (27). This indicates that both high and low BMI may contribute to the risk of ectopic pregnancy, possibly through mechanisms such as hormonal imbalances or altered reproductive system function.

It is important to note that the risk factors identified in this study are consistent with findings from other populations, suggesting that these factors may be universal across different ethnic and geographical groups. However, further research is needed to explore the underlying mechanisms through which these risk factors contribute to the development of ectopic pregnancy. Additionally, the limitations of this study, such as its retrospective nature and reliance on hospital data, should be considered when interpreting the results.

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5. Limitations of the study

The current study has identified certain risk factors associated with ectopic pregnancy. However, due to insufficient data, it was not able to evaluate additional significant risk factors, such as spousal smoking, infertility history, and the use of intrauterine devices. To enhance our understanding of the prevalence of ectopic pregnancy and various risk factors, it is essential to conduct a comprehensive case-control study.

6. Future Recommendation

Future research should focus on developing advanced diagnostic tools for earlier and more accurate detection of ectopic pregnancy to reduce associated morbidity and mortality. Studies exploring novel biomarkers and imaging techniques could significantly enhance diagnostic precision. Additionally, longitudinal studies are recommended to investigate the long-term reproductive outcomes in patients treated for ectopic pregnancy, as well as the effectiveness of emerging minimally invasive management strategies. Expanding research on the impact of socioeconomic and healthcare disparities on ectopic pregnancy outcomes will also help guide targeted interventions and policy improvements.

7. Conclusions

Ectopic pregnancy remains a significant health concern for women of all reproductive ages. At WRH, all patients presenting with abdominal pain have been managed effectively, with no reported fatalities. However, healthcare providers must maintain a high level of suspicion for ectopic pregnancy, even in the absence of amenorrhea or a history of sterilization. The importance of accurate and timely diagnosis in these cases cannot be overstated, as it is essential for optimal management and outcomes. Based on these findings, we strongly recommend establishing an Early Pregnancy Assessment Unit (EPAU) in Kerala. Such a unit would enable early diagnosis and intervention, which may help reduce the incidence of ruptured ectopic pregnancies and minimize associated morbidity and mortality.

Ethical Considerations

The Institutional Review Board (IRB) at King Fahad Hospital issued an ethical authorization to conduct the study. The study site's administration granted permission to collect data from the patient's records. Patient confidentiality was maintained using only the patient's identification number, not their name, in our data collection sheet.

Conflicts of Interest

The author declares that they have no conflicts of interest.

Author Contributions

Gofran Mohammed Al Braheem was solely responsible for the study's conception and design, data collection, analysis, and interpretation. The author drafted the manuscript, revised it critically for intellectual content, and approved the final version for publication.

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