

# Appendectomy as a risk factor for ectopic pregnancy in Taif city

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## Abstract

**Background:** Ectopic pregnancy (EP) is a common obstetric emergency, with high pregnancy related mortality in the first trimester. A major risk factor for EP is surgical procedure that may cause tubal damage and scarring. One of the most common surgery is appendectomy that may lead to adhesions and consequently an EP.

**Objective:** to assess the association and evidence supporting the relationship between appendectomy and EP.

**Methods:** An online cross-sectional case-control study was conducted among cases of women diagnosed with EP, and controls of women who had a normal pregnancy in Taif city in the period from October 2018 to October 2019. A checklist was used that included items on the participants' age, nationality, family history of EP, IUD use, pelvic intervention, pelvic inflammatory diseases, and STDs. For study cases, items about the period between appendectomy and EP, the week of diagnosis of EP and whether treated for EP with medication or surgery were added.

**Results:** The mean age of the participants was (36.71 ±11.49) years; 11.9% had a family history of EP, 77.3% used intrauterine devices, 13.9% had a previous history of a pelvic intervention, 9.9% had a past history of pelvic inflammatory diseases, 7.9% had a history of STDs, and 22.8% had a history of appendectomy. Cases had a significant higher percentage of those who suffered pelvic inflammatory disease and those who had a history of appendectomy, compared to controls. Binary logistic regression found that having a history of pelvic inflammatory diseases and a history of appendectomy were independent predictors for having EP.

**Conclusion:** This study calls for taking a careful history from all pregnant women to assess any risk factors of ectopic pregnancy and to provide proper management to all health problems that may be considered a risk factor of EP.

**Key words:** Appendectomy, risk, factor, ectopic, pregnancy, Taif

## Introduction

A pregnancy that occurs outside the uterine cavity is called an ectopic pregnancy (EP) (1). It is a major health problem for pregnant women (2). EP is considered as a common obstetric emergency (3). EP can lead to massive hemorrhage and infertility and causes pregnancy-related death in the first trimester, accounting for 9-13% of all pregnancy-related deaths.

In the United States, an estimated 30-40 women die each year from an ectopic pregnancy (8). Ninety-five percent of EP's are in the fallopian tubes and 5% are in the cervix, ovaries or abdomen (3). The incidence of EP varies within the population and accounted for 1-2% of all reported pregnancies according to an Iranian and an American study (1,2). The risk factors of EP include a history of pelvic inflammatory disease (PID), previous history of EP, use of an intrauterine device, previous abdominal surgeries, microsurgical procedures, salpingitis, and periadnexal adhesions which showed a significant positive correlation with EP as the outcome (1,6,7).

It is speculated that the main risk factors for EP are conditions or procedures that can cause tubal damage (2). One of those procedures is appendectomy. Appendectomy is the standard treatment for acute appendicitis (4). The most common disease in general surgery is acute appendicitis and the most common surgical procedure is appendectomy (9). The other option of management is an operation; deciding the method if it is open appendectomy or laparoscopy depends on many factors including patient status, availability and expertise (5,9).

In the Kingdom of Saudi Arabia, previous studies showed a prevalence of EP between 0.58–1.13% (10,11,12). A retrospective study was done between January 2000 and December 2010 in all patients admitted to King Fahd Hospital of University, Al-Khobar, Kingdom of Saudi Arabia. This study showed that the prevalence of EP was 1.13%. In those who are undergoing In Vitro Fertilization (IVF), ovulation induction (OI), previous EP patients are significantly more prone to acquire EP the bsecond time around (12).

Studies that assessed the relationship between appendectomy and EP in KSA are scarce, and there is not sufficient data assessing this relationship in Taif city, Saudi Arabia. This study aims to assess the association between appendectomy and EP among a sample of females in the reproductive age.

## Subjects and Methods

**Study design:** An online cross-sectional case-control study among cases was designed to assess the effect of appendectomy on future EP among married women in Taif city hospitals.

**Study duration:** From October 2018 till October 2019. Study settings: An online survey using a pre-designed questionnaire was used for collecting data from the participants.

**Sampling methodology:** According to the participants' responses to the online survey during the study period, the first 32 participants who reported that they were diagnosed with EP were considered as the study cases, and the first 69 respondents who reported that they had a normal pregnancy were considered as the study controls.

**Inclusion criteria:** Cases were females of reproductive age group diagnosed with EP, and controls were females of reproductive age group who had a normal pregnancy.

**Exclusion criteria:** Other cases of acute abdomen not diagnosed as EP

**Study instrument:** The method of data collection was an online survey that contained items on the participant's age, nationality, family history of EP, IUD use, pelvic intervention, pelvic inflammatory diseases, and STDs. For cases, items about the period between appendectomy and EP, the week of diagnosis of EP, and whether treated for EP with medication or surgery, were added.

**Ethical Considerations:** The Research Ethics Committee of Taif University approved the study, and official approvals were also obtained from directors of the study settings.

**Statistical analysis:** Data were coded, tabulated and analyzed using (SPSS) version 20 (Armonk, NY: IBM Corp.). Qualitative data was expressed as numbers and percentages, and Chi-squared test ( $\chi^2$ ) was applied to test the relationship between variables. Quantitative data was expressed as mean and standard deviation (Mean  $\pm$  SD), and independent sample t test was applied for comparison between variables. The binary logistic regression analysis which is a statistical tool to analyze the independent predictors with its odds ratios for a binary outcome (EP) was done.

## Results

Table 1 shows that the mean age of the participants was (36.71 ±11.49) years, and 92.1% of them were of Saudi nationality. Of them, 11.9% had a family history of EP, 77.3% used intrauterine devices, 13.9% had a previous history of a pelvic intervention, and 3% were smokers. Only 9.9% of the participants had a past history of pelvic inflammatory diseases, 7.9% had a history of STDs, and 22.8% had a history of appendectomy.

Table 2 shows that among the cases, most of them (59.4%) had a period between appendectomy and EP of less than one year, and the mean period of diagnosis of EP was 5.5± 2.25 weeks of pregnancy. Most cases (78.1%) had medication for treatment of EP.

Table 3 shows that cases had a significantly higher percentage of those who suffered pelvic inflammatory diseases compared to controls (70% vs 30%) ( $p<0.05$ ). On the other hand, a non-significant difference was found between cases and controls according to their age, nationality, family history of EP, intrauterine device use, history of pelvic intervention or history of STDs.

Figure 1 shows that cases had a significantly higher percentage of those who had history of appendectomy compared to controls (52.2% vs 47.8%) ( $p<0.05$ ).

Table 4 shows that by doing binary logistic regression analysis to detect the independent predictors for the studied variables, it was found that having a history of pelvic inflammatory diseases and a history of appendectomy were independent predictors for having EP.

**Table 1: Descriptive data and past clinical history of the whole sample**

Variable	No. (%)
Age (Mean ±SD)	36.71 ±11.49
Nationality	
- Saudi	93 (92.1)
- Non-Saudi	8 (7.9)
Family history of EP	
No -	89 (88.1)
Yes -	12(11.9)
Intrauterine device (IUD) use	
No -	23 (22.7)
Yes -	78 (77.3)
If yes: what type of device (No.:23)	
Sliver -	3 (3)
Copper -	8 (7.9)
Hormonal -	3 (3)
I don't know -	9 (8.9)
History of pelvic intervention	
- no	87 (86.1)
- yes	14 (13.9)
History of pelvic inflammatory diseases	
- No	91 (90.1)
- Yes	10 (9.9)
History of STDs	
- No	93 (92.1)
- Yes	8 (7.9)
Smoking	
- No	98 (97)
- Yes	3 (3)
History of appendectomy	
- No	78 (77.2)
- Yes	23 (22.8)

Table 2: Descriptive data of EP history of cases

Variable	No. (%)
<b>Period between appendectomy and EP</b>	
- Less than 1 year	19 (59.4)
- 1-< 2 years	8 (25)
- 2-< 3 years	2 (6.3)
- More than 3 years	3 (9.4)
<b>In what week were you diagnosed with EP? (Mean <math>\pm</math>SD)</b>	5.5 $\pm$ 2.25
<b>Were you treated for your EP with medication or surgery?</b>	
- Medication	25 (78.1)
- Surgery	7 (21.9)

Table 3: Comparison between cases and controls according to descriptive data and past clinical history

Variable	Case (No.32)	Control (No. (69)	test	p-value
	No. (%)	No. (%)		
<b>Age (Mean SD)</b>	37.59 $\pm$ 11.98	36.31 $\pm$ 11.31	0.51*	0.6
<b>Nationality</b>				
- Saudi	29 (31.2)	64 (68.8)	0.13**	0.71
- Non-Saudi	3 (37.5)	5 (62.5)		
<b>Family history of EP</b>				
- No	27 (30.3)	62 (69.7)	0.62**	0.42
- Yes	5 (41.7)	7 (58.3)		
<b>Intrauterine device use</b>				
- No	25 (32.1)	53 (57.9)	0.02**	0.88
- Yes	7 (30.4)	16 (69.6)		
<b>History of pelvic intervention</b>				
- No	25 (28.7)	62 (71.3)	2.51**	0.11
- Yes	7 (50)	7 (50)		
<b>History of pelvic inflammatory diseases</b>				
- No	25 (27.5)	66 (72.5)	7.52**	0.006
- Yes	7 (70)	3 (30)		
<b>History of STDs</b>				
- No	27 (29)	66 (71)	3.81**	0.05
- Yes	5 (62.5)	3 (37.5)		

N.B.: \* ( $\chi^2$ ) test

\*\*independent sample t test

Figure 1: Distribution of the history of appendectomy among cases and controls

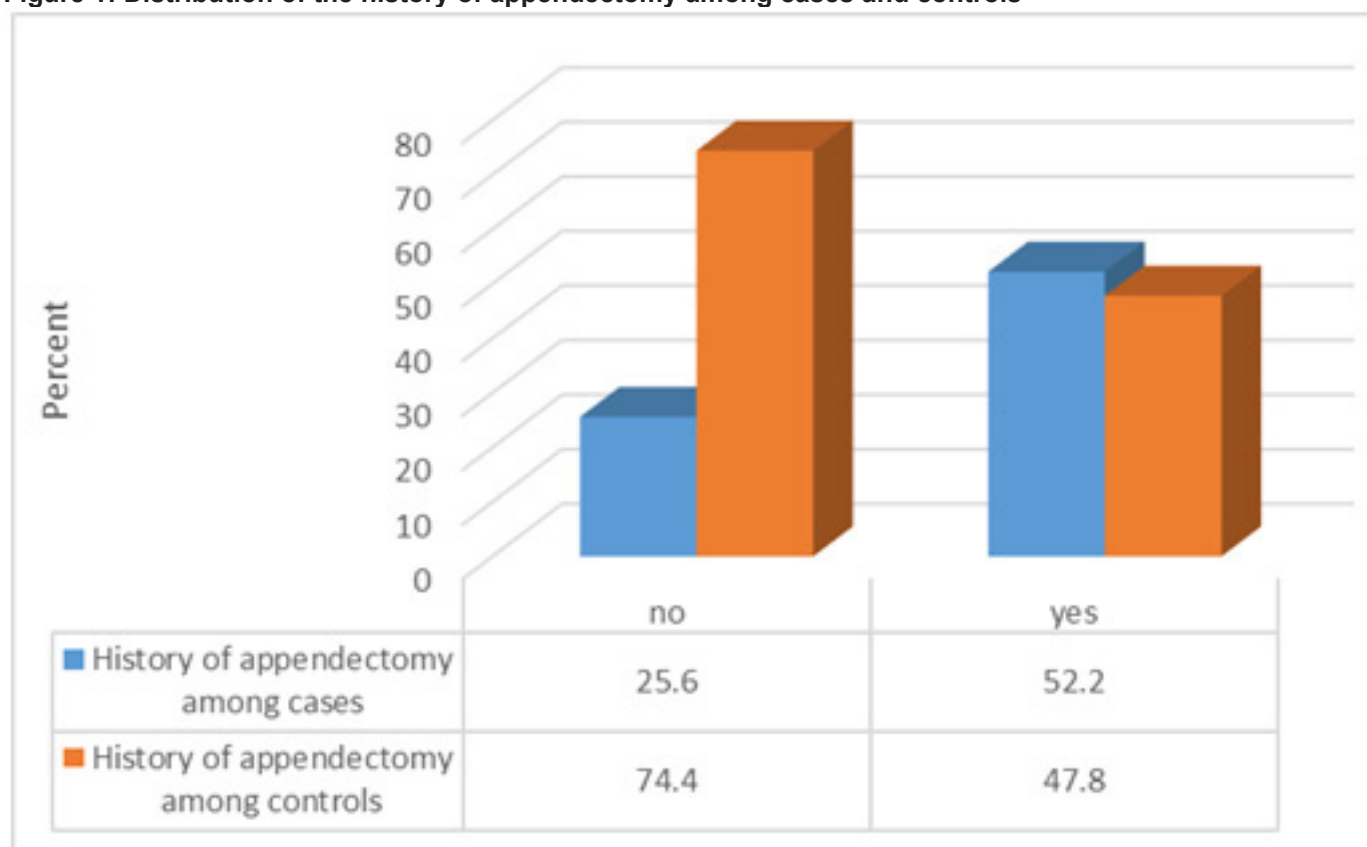


Table 4: Binary logistic regression analysis regarding the risk factors for EP the studied sample

Variable	EP			Significance
	Beta	Wald	Odd's Ratio	
History of pelvic inflammatory diseases	0.43	0.27	3	0.003
History of appendectomy	0.23	0.21	2.3	0.023

## Discussion

In Saudi Arabia, it was reported that there is an increasing rate of EP. A study was done in 2011 to estimate trends in ectopic pregnancies (EP) in a tertiary care center of Eastern Saudi Arabia between January 2000 and 31 December 2011. The yearly incidence in terms of 24,098 deliveries was 1.19% (13).

In the present study, a non-significant difference was found between cases and controls according to the family history of EP, intrauterine device use, or history of pelvic intervention or history of STDs.

Previous studies have found that previous pelvic interventions such as caesarean section was found to be associated with the risk of ectopic pregnancy (10). Our result is different from a study done by Mollison et al (14) who found that women who were delivered by caesarean section were less likely to become pregnant again compared with those who had spontaneous delivery and when these women become pregnant again, compared with those who had spontaneous vaginal delivery, they were more likely to have ectopic pregnancy than others (14,15).

The use of IUD was found to be associated with the risk of ectopic pregnancy in previous studies which found that IUD usage may have an etiological role in ectopic pregnancy (10, 16,17).

The present study showed that EP cases had a significantly higher percentage of those who suffered pelvic inflammatory diseases compared to controls, and cases had a significantly higher percentage of those who had history of appendectomy compared to controls. The same results were revealed from previous studies which showed the association between pelvic surgery such as appendectomy and ectopic pregnancy. These studies explained the peritoneal and peritubal adhesions that occur following these surgeries (18,19,20). The same result was observed in a previous study, where some anomalies, such as miscarriage, ovarian torsion, ovarian cysts, acute appendicitis, kidney stones and pelvic inflammatory disease, have the same signs as an ectopic pregnancy (21).

A study done in Yemen found that the history of previous surgical abdominal operations was detected in (10.77%) cases of EP, and appendectomy was found in 5.83% of cases (22).



In agreement with our study is a Chinese study done in 2015 where women who were diagnosed with intrauterine pregnancies were recruited. This study found that among the risk factors of EP was previous appendectomy (23). In the same time, an Iranian case-control study done in 2014 agreed with our results as women with histories of laparotomy and appendectomy were found to be more likely to have EP compared with controls (24).

### Limitations

A limitation of the present study was the small sample size.

### Conclusion

The present study observed that pelvic inflammatory diseases and a history of appendectomy were independent predictors for having EP. This study calls for proper training of all physicians to take a careful history from all pregnant women to assess any risk factors for ectopic pregnancy and to provide proper management of all health problems that may be considered a risk factor for EP.

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### References

- 1- Brancazio S, Saramago I, Goodnight W, McGinty K. Cesarean scar ectopic pregnancy: Case report. *Radiol Case Rep* 2019;14(3):354-359.
- 2- Moini A, Hosseini R, Jahangiri N, Shiva M, Akhoond MR. Risk factors for ectopic pregnancy: A case-control study. *J Res Med Sci* 2014;19(9):844-849.
- 3- Sotelo C. Ovarian Ectopic Pregnancy: A Clinical Analysis. *The Journal for Nurse Practitioners* 2019;15(3):224-227.
- 4- Esparaz JR, Jeziorczak PM, Mowrer AR, Chakraborty SR, Nierstedt RT, Zumpf KB, et al. Adopting Single-Incision Laparoscopic Appendectomy in Children: Is It Safe During the Learning Curve? *J Laparoendosc Adv Surg Tech A* 2019;29(10):1306-1310.
- 5- Duza G, Davrieux C, Palermo M, Khiangte E, Azfar M, Rizvi SAA, et al. Conventional Laparoscopic Appendectomy Versus Single-Port Laparoscopic Appendectomy, a Multicenter Randomized Control Trial: A Feasible and Safe Alternative to Standard Laparoscopy. *J Laparoendosc Adv Surg Tech A* 2019;29(12):1577-1584.
- 6- Hwang A, Chou L, Islam M, Li Y, Syed-Abdul S. Risk factors for ectopic pregnancy in the Taiwanese population: a retrospective observational study. *Arch Gynecol Obstet* 2016;294(4):779-783.
- 7- Schippert C, Soergel P, Staboulidou I, Bassler C, Galalick S, Hillemanns P, et al. The risk of ectopic pregnancy following tubal reconstructive microsurgery and assisted reproductive technology procedures. *Arch Gynecol Obstet* 2011;285(3):863-871.
- 8- Sepilian VP, Wood E. Ectopic Pregnancy: Practice Essentials, Background, Etiology. *Emedicine.medscape.com*. <https://emedicine.medscape.com/article/2041923-overview#a1>. Published 2019. Accessed October 30, 2019.
- 9- Bhangu A, Søreide K, Di Saverio S, Assarsson J, Drake F. Acute appendicitis: modern understanding of pathogenesis, diagnosis, and management. *The Lancet* 2015;386(10000):1278-1287.
- 10- Alziz S, Al Wafi B, Al Swadi H. Frequency of ectopic pregnancy in a medical centre, Kingdom of Saudi Arabia. *J Pak Med Assoc* 2011;61(3):221-224.
- 11- Eskandar M, Archibong EI, Sadek AA, Sobande AA. Ectopic pregnancy and seasonal variation: a retrospective study from the South Western Region of Saudi Arabia. *Bahrain Medical Bulletin* 2002;24(2):63-65.
- 12- Al-Turki HA. Ectopic pregnancy: Prevalence and risk factors in women attending a tertiary care hospital in Saudi Arabia. *Saudi Med J* 2012;33(8):875-878.
- 13- Al-Turki HA. Trends in ectopic pregnancies in eastern Saudi Arabia. *ISRN Obstetrics and Gynecology* 2013; 3:975251.
- 14- Mollison J, Porter M, Campell D, Bhattacharya S. Primary mode of delivery and subsequent pregnancy. *Br J Obstet Gynecol* 2005; 112: 1061-1065.
- 15- Leven ED. Ectopic pregnancy and spontaneous abortion. In DC Dale, DD Federman, ed, *ACP medicine*, Hamilton, ON: BC Decker 2007; 250-258.
- 16- Speroff L, Fritz MA. Ectopic Pregnancy. In *Clinical Endocrinology and Infertility*. 7th ed. Philadelphia: Lippincott Williams and Wilkins 2005; 1275-1302.
- 17- Condous G. Ectopic pregnancy - risk factors and diagnosis. *Aus Family Physician* 2006; 35: 833-928.
- 18- Brodowska A, Szydłowska I, Starzewska A, Strojny K, Puchalski A, Mieczkowska E. Analysis of risk factors for ectopic pregnancy in own material in the year 1993-2002. *Pol Merkur Lekarski* 2005; 18: 74-77.
- 19- Karaer A, Avsar FA, Batioglu S. Risk Factors for ectopic pregnancy: a case control study. *Aus NZ J Obstet Gynaecol* 2006; 46: 521-527.
- 20- Cunningham FG. Ectopic pregnancy. In *Williams Obstetrics*; 22nd ed, New York: Mc Graw-Hill 2005; 253-272.
- 21- Zain H, Albarakati RG, Abdallah YMY, Dhayfallah AT, Elgak S, Mohamed EY, Ebaid E. Clinical analysis of ectopic pregnancies in Majmaah, Saudi Arabia. *Biomedical Research* 2019; 30(5): 800-804.
- 22- Al-Mola SJ, Abdul AK, Omer SK. A Retrospective Study of Ectopic Pregnancy. *RJPBCS* 2019; 10(3): 435-446.
- 23- Li C, Zhao W, Zhu Q, Cao S, Ping H, Xi X, et al. Risk factors for ectopic pregnancy: a multi-center case-control study. *BMC Pregnancy Childbirth* 2015; 15: 187-196.
- 24- Moini A, Hosseini R, Jahangiri N, Shiva M, Akhoond MR. Risk factors for ectopic pregnancy: A case-control study. *J Res Med Sci* 2014; 19(9): 844-849.