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RISK FACTORS OF DISRUPTED ECTOPIC PREGNANCY IN PREGNANT WOMEN

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ABSTRACT
Disrupted ectopic pregnancy is a serious pregnancy complication that threatens the life of both the fetus and the mother, yet there is limited exploration and analysis of the risk factors associated with disrupted ectopic pregnancy. This study aims to identify the risk factors affecting disrupted ectopic pregnancy. Method: This research is a case-control study with an analytical observational design. The sample used secondary data from medical records of 100 pregnant women with disrupted ectopic pregnancy in the case group and 100 pregnant women without disrupted ectopic pregnancy in the control group at Dr. Moewardi Regional Public Hospital from 2020-2025. Data were analyzed using the Chi-Square test to determine the p-value and odds ratio. The p-values for maternal age, gestational age, parity, abortion history, history of disrupted ectopic pregnancy, contraceptive use, and history of reproductive disease are all 0.000 or 0.003 (<0.05), indicating significant associations between these factors and the occurrence of disrupted ectopic pregnancy. There is a significant relationship between maternal age, gestational age, parity, abortion history, history of disrupted ectopic pregnancy, contraceptive use, and history of reproductive diseases in women with disrupted ectopic pregnancy.

Keywords: abortus; age; contraceptive history; ectopic pregnancy disrupted; gestasional age; parity

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INTRODUCTION

Pregnancy is the process of union between sperm and egg cells, followed by nidation or implantation (Kurniawati1 & Ediningtyas, 2021). Pregnancy is a normal physiological and psychological condition, but it can pose significant risks to women (Wirata et al., 2022). An ectopic pregnancy happens when the fertilized egg attaches outside the uterine lining. Ectopic pregnancies are disrupted when the fallopian tube ruptures or in the event of a miscarriage(Sarwati et al., 2023). Ectopic pregnancy can also result from sexually transmitted infections during adolescence (Subani et al., 2022). One of the important health issues currently faced by the Indonesian nation is the high maternal mortality rate (Novitasari & Pratiwi, 2019). One of the indicators of the success of maternal health initiatives is the Maternal Mortality Ratio (MMR) (Roobiati et al., 2019). The Maternal Mortality Ratio (MMR) acts as a measure of the risks women encounter during pregnancy and childbirth (Baity & Rahayuningsih, 2023). The causes of maternal deaths are primarily due to complications during pregnancy(Rahayu et al., 2024). According to WHO data (2024), the maternal mortality rate in Indonesia is 189 per 100,000 live births. Disrupted ectopic pregnancy ranks as the fourth leading cause of maternal death during the first trimester of pregnancy. Over 95% of disrupted ectopic pregnancies occur in different sections of the fallopian tube, including the interstitial part (1%), isthmus (5%), ampullary region (85%), and infundibular part (9%). Rare implantation sites include the cervix, ovary, and peritoneum (Hayati, 2023).

Recurrent pregnancies can increase the likelihood of a disrupted ectopic pregnancy, especially if the mother has a history of previous pregnancies such as miscarriages or previous ectopic pregnancies. Women with a history of medical and obstetric conditions are also more likely to experience a disrupted ectopic pregnancy, with a rate of 94.6%. There is a correlation between previous medical and obstetric history and the risk of disrupted ectopic pregnancy (Kemenkes RI, 2024).

According to Widiasari & Dewi Lestari (2021), several factors increase the likelihood of an ectopic pregnancy, including a history of tubal damage, such as a previous ectopic pregnancy or tubal surgery. Other risk factors include tubal infections, sexually transmitted diseases, and advanced maternal age. Salpingitis, or inflammation of the fallopian tubes, contributes to 9% of ectopic pregnancy cases experienced by pregnant women. Currently, there are various reproductive health issues commonly experienced by women, such as menstrual problems, infertility, reproductive tract infections, ovarian cysts, endometriosis, and various types of reproductive cancers (Rahmadani & Rahayuningsih, 2024).

Age, gravida, medical history, previous obstetric history, and contraceptive history are risk factors for disrupted ectopic pregnancy (Aravianti et al., 2022). In line with research conducted by Suheimi & Dewi Utari (2023), the majority of women who experience disrupted ectopic pregnancies fall within the 20-40 years age group. Pregnant women who understand the potential high-risk factors of pregnancy tend to make efforts to avoid, prevent, and address issues that may arise (Hariyanto & Rahayuningsih, 2023). It is important to quickly detect symptoms, provide support, and administer appropriate treatment so that both the mother and baby can manage the condition and avoid serious negative consequences (Oktaviana et al., 2024).

In 2023, there were 93.14 maternal deaths per 100,000 live births in Central Java, Indonesia. The total number of maternal mortality cases that year was 425. Based on a preliminary study conducted at Dr. Moewardi Hospital in Surakarta from January 1, 2020, to September 30, 2024, 168 cases of pregnant women with disrupted ectopic pregnancies were identified. From the information above, it is clear that disrupted ectopic pregnancies remain a significant issue, and there are variations in research outcomes related to the risk factors for disrupted ectopic pregnancy. Therefore, the researcher is interested in conducting a study to identify the risk factors for disrupted ectopic pregnancy at Dr. Moewardi Hospital in Surakarta from 2020 to 2024. The variables to be studied include maternal age, gestational age, parity, history of abortion, history of previous disrupted ectopic pregnancy, contraceptive history, and reproductive disease history.

METHOD

This study employs an analytical observational design. It is a case-control study involving two groups, there are the case group and the control group. The sample in this study consists of secondary data or medical records of pregnant women, with a 1:1 ratio. This means that the case group consists of 100 medical records of pregnant women with disrupted ectopic pregnancies, while the control group consists of 100 medical records of pregnant women without disrupted ectopic pregnancies, from Dr. Moewardi General Hospital in Surakarta between 2020 and 2024. The case group includes complete medical records of pregnant women who experienced disrupted ectopic pregnancies and were treated at Dr. Moewardi General Hospital Surakarta during the 2020-2024 period. The control group includes complete medical records of pregnant women who did not experience ectopic pregnancies or disrupted ectopic pregnancies and were also treated at Dr. Moewardi General Hospital

Surakarta during the 2020-2024 period. The exclusion criteria for this study are incomplete medical records and cases where the pregnant women did not experience a disrupted ectopic pregnancy.

The instrument used in this study is a checklist, which is a list containing codes for various symptoms or other identities of the variables being studied, marked accordingly. The checklist created by the researcher is formatted to align with the necessary content for secondary data. This secondary data is sourced from the medical records at Dr. Moewardi General Hospital Surakarta from 2020 to 2024. The variables studied include maternal age, gestational age, parity, abortion history, contraception history, history of previous disrupted ectopic pregnancy, and history of reproductive diseases. Demographic data analysis uses the independent t-test. Bivariate analysis uses the chi-square test to determine the p-value and odds ratio (OR). The confidence level used is 95% (α = 5%), so the statistical test is considered significant if the p-value < 0.05. The Fisher exact test is applied when the conditions for the chi-square test are not satisfied.

RESULT

Table 1.
Frequency distribution of respondent characteristics based

Categories	f case	%	f control	%
Age :				
< 20 years old	19	19	5	5
20-35 years old	37	37	58	58
>35 years old	44	44	37	37
Gestasional age :				
1-4 weeks	5	5	1	1
5-8 weeks	73	73	4	4
9-12 weeks	20	20	8	8
≥13 weeks	2	2	87	87
Education history :				
Elementary school	27	27	3	3
Junior high school	49	49	24	24
Senior high school	11	11	34	34
College	13	13	39	39
Job :				
Self employed	19	19	12	12
Employee	8	8	9	9
Teachers / lectures / civil servants / nurses / midwives / villages officials	13	13	17	17
Traders	11	11	2	2
Labores / farmer	16	16	2	2
Housewife	33	33	58	58
Student	0	0	0	0

Table 2.
Relationship between these factors and disrupted ectopic pregnancy of pregnant women

Factor	Disrupted Ectopic Pregnancy Occurance								
	f case	%	Total case	f control	%	Total control	OR	95% CI	P - Value
Age :									
Risk									
<20 y.o	19	19		5	5				
>35 y.o	44	44	100	37	37	100	2.351	1.333-4.149	0.003
No risk									
20-35 y.o	37	37		58	58				
Gestasional age :									
Risk									
1-4 weeks	5	5		1	1				
≥13 weeks	2	2	100	87	87	100	97.429	36.688-258.728	0.000
No risk									
5-8 weeks	73	73		4	4				
9-12 weeks	20	20		8	8				
Parity									
Risk			100			100			
Parity ≤ 1	21	21		21	21				
Parity > 3	52	52		11	11		5.745	3.123 – 10.568	0.000
No risk									
Parity 2-3	27	27		68	88				
Abortion history									
Yes (risk)	88	88	100	34	34	100	14.235	6.850 – 29.581	0.000
No (no risk)	12	12		66	66				
Previous disrupted ectopic pregnancy history									
Yes (risk)	92	92	100	10	10	100	103.500	39.077 – 274.134	0.000
No (no risk)	8	8		90	90				
Contrasception history									
Risk									
IUD	26	26		4	4				
Pill	25	25		3	3				
1 month contraceptive injection	12	12		1	1				
3-month contraceptive injection	14	14	100	10	10	100	21.000	10.169 – 43.368	0.000
Implant	7	7		2	2				
Condom	0	0		2	2				
No risk									
Not use	16	16		78	78				
Previous disrupted ectopic pregnancy history									
Yes (risk)	92	92	100	10	10	100	7.452	3.970 – 13.987	0.000
No (no risk)	8	8		90	90				
Reproductive disease history									
Yes (risk)	77	77	100	31	31	100	7.452	3.970 – 13.987	0.000
No (no risk)	23	23		69	69				

The p-value for maternal age is 0.003 (<0.05), suggesting a significant relationship between maternal age and the occurrence of disrupted ectopic pregnancy. The p-value for gestational age is 0.000 (<0.05), showing a significant association between gestational age and the occurrence of disrupted ectopic pregnancy. The p-value for parity is 0.000 (<0.05), indicating a significant link between parity and the occurrence of disrupted ectopic pregnancy. A history of abortion has a p-value of 0.000 (<0.05), reflecting a significant correlation between abortion history and the occurrence of disrupted ectopic pregnancy. The p-value for a history of disrupted ectopic pregnancy is 0.000 (<0.05), indicating a significant association between a prior ectopic pregnancy and the occurrence of disrupted ectopic pregnancy. The p-value for contraceptive history is 0.000 (<0.05), showing a significant connection between contraceptive use and the occurrence of disrupted ectopic pregnancy. Lastly, the p-value for a history of reproductive diseases is 0.000 (<0.05), indicating a significant relationship between a history of reproductive diseases and the occurrence of disrupted ectopic pregnancy.

DISCUSSION

The Relationship Between Maternal Age and Disrupted Ectopic Pregnancy

Based on the research results, in the case group of pregnant women at risk of experiencing disrupted ectopic pregnancy, 63% of the respondents were found, while in the control group, 42% of the respondents experienced disrupted ectopic pregnancy. Maternal age is the primary risk factor in this study, especially in older age, as aging can lead to an increased likelihood of chromosomal abnormalities in the trophoblastic tissue. Additionally, changes in the function of the fallopian tubes can hinder the transportation of the ovum (Sari et al., 2021).

In this study, the age categories of pregnant women at risk of experiencing a disrupted ectopic pregnancy were those aged over 20 years and over 35 years, while the low-risk group was between 20-35 years old. The findings also reveal that most respondents in the high-risk category were older than 35, making up 44% of the case group. The likelihood of ectopic pregnancy rises with increasing maternal age. Women over 35 years old have a four times higher risk of ectopic pregnancy, which is related to the decline in reproductive organ function with age. Pregnancy at over 35 years old increases the risk of a combination of age-related diseases and pregnancy itself, which can increase the likelihood of maternal and fetal mortality or disability. Moreover, maternal age also influences the likelihood of ectopic pregnancy due to the decline in reproductive organ function in women (Sarwati et al., 2023). Women aged ≥35 years are at higher risk for ectopic pregnancy, along with other pregnancy complications such as spontaneous abortion and preeclampsia (Correa-De-Araujo & Yoon, 2021).

Furthermore, the majority of the low-risk age group, 20-35 years old, made up 58% in the control group. This contradicts a study conducted by Aravianti et al. (2022), which showed that women aged 20-35 years were most likely to experience disrupted ectopic pregnancy. The age range of 20 to 35 years is regarded as an optimal age for pregnancy, as the uterus is prepared to sustain a pregnancy (Mufida & Sulastri, 2022). Women who become pregnant under the age of 20 are still in the growth phase, so their pelvic size is likely smaller, increasing the risk of ectopic pregnancy (Sarwati et al., 2023).

The statistical test results in this study revealed a p-value of 0.003 (<0.05), indicating a significant relationship between maternal age and the occurrence of disrupted ectopic pregnancy. With an odds ratio (OR) of 2.351, this means that pregnant women at risk (<20 years, >35 years) are 2.351 times more likely to experience disrupted ectopic pregnancy compared to pregnant women in the low-risk group (20-35 years). This result aligns with the

research by Sarwati et al. (2023), where statistical analysis using regression analysis produced a significant value (0.023), with a probability < α (0.05), leading to the acceptance of Ha and rejection of Ho, indicating a relationship between maternal age and disrupted ectopic pregnancy at Bahteramas General Hospital, Southeast Sulawesi. From the explanation above, the researcher concludes that maternal age is associated with the occurrence of disrupted ectopic pregnancy. Mothers < 20 years old or > 35 years old are at greater risk of experiencing this condition. At under 20 years old, the mother's reproductive organs are still developing, while at over 35 years old, reproductive organ function begins to decline. Therefore, being <20 years old or >35 years old, which is outside the optimal reproductive age range, can increase the likelihood of complications during pregnancy.

The Relationship Between Maternal Gestational Age and Disrupted Ectopic Pregnancy

Based on the research results regarding maternal gestational age, it was found that in the case group, pregnant women at risk of experiencing disrupted ectopic pregnancy had a higher gestational age compared to those not at risk. A total of 93 pregnant women (93%) in the case group were in the at-risk category, compared to 12 pregnant women (12%) in the control group. The at-risk group was categorized as having a gestational age of 5-8 weeks and 9-12 weeks, while the low-risk group was categorized as having a gestational age of 1-4 weeks and ≥13 weeks. This study show that in the case group, 93% of pregnant women were in the at-risk age group, with the majority being in the gestational age range of 5-8 weeks. This aligns with the research by Aravianti et al. (2022), which found that disrupted ectopic pregnancy most commonly occurred in women with a gestational age of 5-8 weeks.

In contrast, in the control group, 87% of pregnant women were in the low-risk category, with the majority having a gestational age of ≥13 weeks. Ectopic pregnancy most commonly occurs in the fallopian tubes compared to other locations. The fallopian tube is the site where the egg and sperm meet; however, it is not an ideal location for a fertilized ovum to implant and develop, so the fetus will not develop normally as it would in the uterus. Ectopic pregnancy in the fallopian tube generally experiences complications between the gestational ages of 6-10 weeks (Widiasari & Dewi Lestari, 2021).

The results of the statistical test showed a p-value of 0.000 (<0.05), suggesting a significant association between gestational age and the occurrence of disrupted ectopic pregnancy. With an odds ratio (OR) of 97.429, this means that pregnant women with a gestational age of 5-8 weeks and 9-12 weeks are 97.429 times more likely to experience a disrupted ectopic pregnancy compared to those in the low-risk group (1-4 weeks and ≥13 weeks). This result aligns with the study conducted by Awadalla Abdelwahid et al. (2023), where the majority of pregnancies presented at 6-7 weeks, accounting for 51.2%, followed by 8-9 weeks at 32.9%.

The Relationship Between Parity and Disrupted Ectopic Pregnancy

The parity of pregnant women in this study showed that in the case group, women with at-risk parity (parity ≤1 and parity > 3) had a higher incidence of disrupted ectopic pregnancy (KET) compared to those with lower risk (parity 2-3). A total of 73 (73%) pregnant women in the case group experienced KET, compared to 68 (68%) pregnant women in the control group. The higher incidence in multigravida women is likely due to previous miscarriages and infections that cause damage to the fallopian tubes (Chirammal, 2022). In the case group, the majority had a parity of >3 (at-risk category), which accounted for 52%, while in the control group, the majority had a parity of 2-3 (low-risk category), which accounted for 68%. This finding is consistent with the study by Suheimi & Dewi Utari (2023), where most women who experienced disrupted ectopic pregnancy had a parity range of 2-5 (multipara).

The statistical analysis in this study yielded a p-value of 0.000 (<0.005), suggesting a significant association between parity and the occurrence of disrupted ectopic pregnancy. With an odds ratio (OR) of 5.745, this means that pregnant women with at-risk parity (≤1, > 3) are 5.745 times more likely to experience disrupted ectopic pregnancy compared to those with a lower-risk parity (2-3). This finding aligns with the research by Hayati (2023), the statistical analysis showed a p-value of 0.02 (<0.05), suggesting a link between parity and the occurrence of disrupted ectopic pregnancy at the Bangkinang Regional Public Hospital in 2019. The OR value was 3.87 (95% CI: 1.34-11.17), meaning that in the case group of disrupted ectopic pregnancy, women with at-risk parity were 3.87 times more likely to experience KET compared to women with lower-risk parity.

The Relationship Between Abortion History and Disrupted Ectopic Pregnancy

The history of abortion in the respondents of this study showed that in the case group, women with a history of miscarriage (those who have undergone an abortion) had a higher incidence of disrupted ectopic pregnancy compared to those without a history of abortion. A total of 88 (88%) pregnant women in the case group experienced disrupted ectopic pregnancy, compared to 66 (66%) pregnant women in the control group. Abortion is a risk factor that significantly influences the occurrence of ectopic pregnancy (Kurniawati et al., 2024). Abortion can lead to infections in the uterus that are left untreated or damage to the uterine wall, particularly in cases of recurrent abortion. Infections that are not properly treated can cause adhesions in the fallopian tubes, which may lead to kinking (blockages caused by twisted tubes) and narrowing of the lumen, thus increasing the risk of ectopic pregnancy (Aravianti et al., 2022).

The statistical test results showed a p-value of 0.000 (<0.005), suggesting a significant association between a history of abortion and the occurrence of disrupted ectopic pregnancy. With an odds ratio (OR) of 14.235, this means that pregnant women with a history of abortion are 14.235 times more likely to experience disrupted ectopic pregnancy compared to those without a history of abortion. Similar findings were reported in a study by Sadiq & Mir (2023), which found that patients with a history of abortion were more commonly present in the case group compared to the control group (23.3% vs. 8.3%; p-value = 0.024*), highlighting the significant role of abortion history in the development of ectopic pregnancy. The main risk factor in the study population conducted by Shaltout et al. (2022) was a history of miscarriage (26.6%).

The Relationship Between a History of Previous Disrupted Ectopic Pregnancy and Disrupted Ectopic Pregnancy

In this study, respondents with a history of disrupted ectopic pregnancy showed that in the case group, those with a history of previous disrupted ectopic pregnancies (at risk) had a higher incidence of disrupted ectopic pregnancies compared to those without a previous history of ectopic pregnancy (not at risk). A total of 92 (92%) pregnant women in the case group experienced disrupted ectopic pregnancies, compared to 90 (90%) pregnant women in the control group. A prior history of ectopic pregnancy accounts for 4% of the occurrence of current ectopic pregnancies (Harish et al., 2021). Sadiq & Mir (2023) it was stated that pregnant women with a prior history of ectopic pregnancy are 7 to 9 times more likely to experience a disrupted ectopic pregnancy. Women with a history of ectopic pregnancy, whether due to fallopian tube damage or other factors, are more likely to experience another ectopic pregnancy.

The statistical test results showed a p-value of 0.000 (<0.005), there is relationship between a history of disrupted ectopic pregnancy and the occurrence of disrupted ectopic pregnancy. With an odds ratio (OR) of 103.500, this means that pregnant women with a history of previous disrupted ectopic pregnancy are 103.500 times more likely to experience disrupted ectopic pregnancy compared to those without a history of previous ectopic pregnancy. These results align with a study conducted by Hayati (2023), which found a p-value of 0.002 < a (0.05), indicating a relationship between a previous history of disrupted ectopic pregnancy and the occurrence of disrupted ectopic pregnancy at RSUD Bangkinang in 2019. The OR was 5.16 (CI= 95%: 1.74-15.13), meaning that in the case group of disrupted ectopic pregnancies, women with a prior history of disrupted ectopic pregnancy were 5.13 times more likely to have another disrupted ectopic pregnancy compared to those without such a history.

The Relationship Between Contraceptive History and Disrupted Ectopic Pregnancy

The contraceptive history of the respondents in this study shows that in the case group, those with a history of contraceptive use (at risk) had a higher incidence of disrupted ectopic pregnancies compared to those without contraceptive use (not at risk). A total of 84 (84%) pregnant women in the case group experienced disrupted ectopic pregnancies, compared to 80 (80%) pregnant women in the control group. In the case group, the most common contraceptive method used was the IUD (intrauterine device), accounting for 26%. Meanwhile, in the control group, the majority had no history of contraceptive use. This finding is consistent with a study by Suheimi & Dewi Utari (2023), which found that most women who experienced disrupted ectopic pregnancies had previously used contraceptives such as the IUD. Chirammal (2022) explained that although the IUD does not impact ovulation, it prevents intrauterine pregnancies but does not prevent ectopic pregnancies. The risk of ectopic pregnancy is higher if a woman becomes pregnant while the IUD is still in place.

The statistical test results showed a p-value of 0.000 (<0.005), indicating a significant relationship between contraceptive use and the occurrence of disrupted ectopic pregnancies. With an odds ratio (OR) of 21.000, this means that pregnant women who used contraception (at risk) are 21,000 times more likely to experience disrupted ectopic pregnancies compared to those who did not use contraception (not at risk). These findings are in line with research by Sadiq & Mir (2023), which found a relationship between the use of IUDs and the risk of ectopic pregnancy (13.3% vs. 1.7%; p-value = 0.015).

The Relationship Between a History of Reproductive Diseases and Disrupted Ectopic Pregnancy

The reproductive disease history in this study shows that in the case group, those with a history of reproductive disease (at risk) had a higher incidence of disrupted ectopic pregnancies compared to those without a history of reproductive disease (not at risk). A total of 77 (77%) pregnant women in the case group experienced disrupted ectopic pregnancies, compared to 69 (69%) pregnant women in the control group. In the case group, most pregnant women with a history of reproductive diseases had a history of ovarian cysts (29%). In contrast, the majority of women in the control group had no history of reproductive diseases (69%). This is consistent with a study by Suheimi & Dewi Utari (2023), which found that women who experienced disrupted ectopic pregnancies mostly did not have a history of reproductive diseases.

The statistical test results showed a p-value of 0.000 (<0.005), indicating a significant relationship between the history of reproductive disease and the occurrence of disrupted

ectopic pregnancy. With an odds ratio (OR) of 7.452, this means that pregnant women with a history of reproductive disease (at risk) are 7.452 times more likely to experience disrupted ectopic pregnancies compared to those without a history of reproductive disease (not at risk). Similarly, a study by Awadalla Abdelwahid et al. (2023) it was found that the most prevalent risk factor among patients was a history of pelvic infection, with a prevalence of 29.3% and an odds ratio (OR) of 5.345 (CI 3.055–9.721). Previous research has shown a strong link between a history of reproductive diseases and ectopic pregnancies, with OR values ranging from 2.0 to 10.1.

CONCLUSION

Based on the study results, tt can be inferred that factors contributing to the risk of disrupted ectopic pregnancy include maternal age, gestational age, parity, history of abortion, history of previous ectopic pregnancy, contraceptive history, and history of reproductive diseases. These factors can lead to a decline in the function of reproductive organs, such as a decrease in fallopian tube function, abnormalities in fallopian tube muscle movement, and narrowing of the fallopian tubes, thereby increasing the risk of disrupted ectopic pregnancy.

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