Overview of The Risk Factors of Spontaneous Abortus Among Young Pregnancy Woman: A Systematic Review

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Abstract

Objective: To identify the risk factors of spontaneous abortus among young pregnancy women.

Methods: We used PubMed and ScienceDirect databases and electronic journals such as the American Journal of Obstetrics and Gynecology and the International Journal of Gynecology and Obstetrics. The articles were screened based on inclusion and exclusion criteria. The keywords used for inclusion were "Risk Factors," "Abortus," and "Young Maternal Age." Next, articles were quality assessed using the JBI Critical Appraisal Checklist. The extracted data were presented in the table and narrative synthesis.

Result: This review has six studies that has identified the risk factors of spontaneous abortus among young pregnancy woman. The risks were body mass index, maternal habits, infection, coital, and experience of IPV. However, some factors, such as iodine level, are insignificant to spontaneous abortuses. This review also found that infection also had a role in the complications of spontaneous abortus. The limitation of this study was each variable was different in each survey. So, we couldn't compare each variable to avoid bias from each study.

Conclusion: The most affected risk factors of spontaneous abortus among young pregnancy woman are an infection, followed by first coital age, IPV, partner controlling behaviour, BMI, and maternal smoking habit.

Keywords: Spontaneous abortus, Risk factor, Young pregnancy woman

Faktor Risiko Abortus Spontan pada Kehamilan Usia Muda : *Systematic Review*

Abstarak

Tujuan: Mengidentifikasi faktor risiko abortus spontan pada kehamilan usia muda.

Metode: Kami menggunakan *database web-based* berupa *PubMed* dan ScienceDirect dan jurnal elektrik berupa *American Journal of Obstetrics and Gynecology* dan *International Journal of Gynecology.* Artikel yang didapatkan akan dilakukan skrining berdasarkan kriteria inklusi dan kriteria eksklusi. Kata kunci yang digunakan untuk melakukan inklusi berupa "Faktor Risiko", "Abortus", dan "Kehamilan Usia Muda". Selanjutnya, artikel dilakukan penilaian kualitas menggunakan JBI *Critical Appraisal Checklist*. Data yang diekstrak disajikan dalam bentuk dabel dan narasi.

Hasil: Sebanyak 6 penelitian yang ditelaah mengidentifikasi faktor risiko abortus spontan pada kehamilan usia muda berupa indeks massa tubuh, kebiasaan ibu hamil, infeksi, koitus, dan pengalaman kekerasan oleh pasangan. Namun, kadar iodine dalam tubuh tidak memengaruhi secara signifikan kejadian abortus spontan. Penelitian ini juga menemukan bahwa infeksi juga memiliki peran dalam terjadinya komplikasi pada abortus spontan. Keterbatasan pada penelitian ini adalah tidak ada variable yang sama dari artikel ditelaah. Oleh karena itu perbandingan tidak dapat dilakukan untuk mencegah kemungkinan kecenderungan pada penelitian yang ditelaah.

Kesimpulan: Faktor risiko yang paling mempengaruhi abortus spontan pada ibu hamil Ketika usia muda adalah infeksi, diikuti dengan usia pada saat koital pertama, kekerasan dari pasangan, kebiasaan mengontrol pasangan, indeks massa tubuh, dan kebiasaan merokok.

Kata kunci: Abortus spontan, Faktor risiko, Kehamilan usia muda

 DOI: 10.24198/obgynia.v8i1.741

Introduction

Fetal Mortality Rate (FMR) is the number of fetal deaths for every 1,000 live births and the number of fetal deaths in a certain period.[1] In decades, the fetal mortality rate in high-income countries generally ranged from 35-50 per 1,000 live births.[2] Fetal mortality is divided into three periods based on gestational age. There are less than 20 weeks of gestational age (abortus), 20-27 weeks (early fetal death), and 28 weeks or more (late fetal death).[1]

Abortus is divided into Spontaneous Abortus (naturally) and Induced Abortion (surgically). The prevalence of spontaneous abortus in the world is about 10-28%.[3]more recent examinations from population-based data of US women are lacking. METHODS: We used data from the 1995, 2002, 2006-2010, 2011-2015 National Survey of Family Growth on self-reported pregnancy loss (miscarriage, stillbirth, ectopic pregnancy Most spontaneous abortus happens in the first trimester of pregnancy. It is caused by several factors such as deficiency immunologic, hormonal, infection, anatomical abnormality, maternal chronic disease, and maternal lifestyles. [4]

Biologically, the reproductive age for a woman to be ready to get pregnant is 20-35 years. So that younger woman has a risk of pregnancy problems. The mother's immune system may cause it, and the reproductive organ is still developed.[5] The pregnancy for a woman who is less than 20 years old will have some risk of experiencing spontaneous abortus. The fetus needs nutrition from its mother to fight over the food for their needs. The mother physically does not grow ideally in a place for fetal growth.[6] Pregnant women might experience immunologic changes and be more susceptible to infections. A woman who gets an infection during pregnancy can lead to spontaneous abortion.[5] Up to 15% of infections reported on early miscarriage and up to 66% on late miscarriage.[7] The effects of spontaneous abortus are sepsis, cervical lesions, and maternal death. Spontaneous abortus has physiological effect such as feels sad, social isolation, and guiltiness.[8]

Woman has reproductive period to optimizing the pregnancy process. If the woman get pregnant out of the reproductive period, then the risk of spontaneous abortus increased. A study on Hasan Sadikin Hospital on period 2017 – 2018, the distribution of pregnant woman in young age has a small number.[9] So the risk factors of spontaneous abortus on young maternal age is not identified generally. Therefore, this study will collect information from several journals to identify the risk factors of spontaneous abortus among young age.

Method

Searching Strategy

This research exploring the existing literature publish in the last 5 years since January 1, 2019. The articles conducted by searching online database including Google Scholar, PubMed, and Science Direct. Moreover, the articles including from American Journal of Obstetrics and Gynecology and International Journal of Gynecology and Obstetrics. This article used three central concept medical subject heading (MeSH), there are "Maternal Age", "Risk Factor", and "Abortus". The identified search terms were combined using Boolean operators "OR" and "AND". Specific search term strategies used on each database are detailed in **Table 1**. The combined terms will be add on query box on each database. This exploring filtered by English and publishing period for 5 years (2019—2023).

Table 1 Searching Strategy

Key Words	
1.	Young Maternal Age OR Young Mother Age OR Young Pregnant OR Adolescence Pregnancy OR Teenager Pregnancy
2.	Risk Factor
3.	Abortus OR Abortion OR Miscarriage OR Spontaneous Abortus OR Early Pregnancy Loss
4.	1 AND 2 AND 3
Filters	
Google Scholar	English, Research Articles, In Last 5 Years, Filetype: pdf
PubMed	English, Free Full Text, In Last 5 Years
Science Direct	English, Research Articles, In Last 5 Years
American Journal of Obstetrics and Gynecology	Research Articles, In Last 5 Years
International Journal of Gynecology and Obstetrics	In Last 5 Years, Journal

Study Selection

All the articles that have been collected will be screened using the Rayyan application. The first step is identifying the duplication of the articles collected using the Rayyan application. After that, the articles will screen by title and abstract using Rayyan application according exclusion criteria. The last step of study selection is to read the full articles to check the desired data (factors of abortus in young maternal age (woman under 20 years old)). Any disagreement was resolved through discussion or with the help of the third reviewers. The criteria inclusion and exclusion detailed below:

Inclusion criteria:
Articles about risk factors of abortus in young maternal age, articles published from January 1, 2019, to November 31, 2023, articles written in English, and original research articles.

Exclusion criteria:
Articles is not relevant to the topic of research, articles is only or less information of abstract/ title, the articles type are review, letter, and comment, the design study of articles is not observational, and there are no variable of woman less than 20 years old.

Study Quality Assessment

A JBI Critical Appraisal Checklist was used to evaluate the articles' quality based on the method. It aims to assess the articles to solve the chance of bias in the process and analysis of the data. The reviewers independently. Any disagreement was resolved through discussion or with the help of the third reviewer. The quality of the articles was good if they achieved a minimum of 60% of "YES" on all questions, and it was poor if the articles did not reach a minimum of 60% of "YES".

Data Extraction and Analysis

Reviewers independently used Google *Spreadsheet* to extract the data. The extraction data included: 1) characteristics of the articles (author, design study, publication year, study year, location study, and quality assessment), 2) outcomes of the study (author, type of population, sample size, sample age, risk factors, outcomes, and conclusion). Extracted

data will be analyzed, presented in tables, and summarized using narrative synthesis. Any disagreement was resolved through discussion or with help of the third reviewers.

Result

6,423 articles are included. After removing the duplicate articles, 5,654 articles screened titles and abstracts using the exclusion criteria. Then, the 28 articles remained will screened by the full text. After that, the remaining articles were 6 and will be reviewed on this study. **(Figure 1)**.

All 6 included studies are observational: 4 were cross-sectional studies[10–13]the underlying causes of infectious vaginitis have been neglected. Therefore, this study aimed to determine the prevalence and risk factors associated with bacterial vaginosis (BV, 1 cohort study[14], and 1 case-control study[14]. The location of the study were: 2 in Asia[10,12]the underlying causes of infectious vaginitis have been neglected. Therefore, this study aimed to determine the prevalence and risk factors associated with bacterial vaginosis (BV, 2 in Africa[11,13]describe their management, and identify sociodemographic and clinical factors associated with abortion-related infections. Methods: A secondary analysis of the WHO Multi-Country Survey on Abortion-related morbidity (MCS-A, and

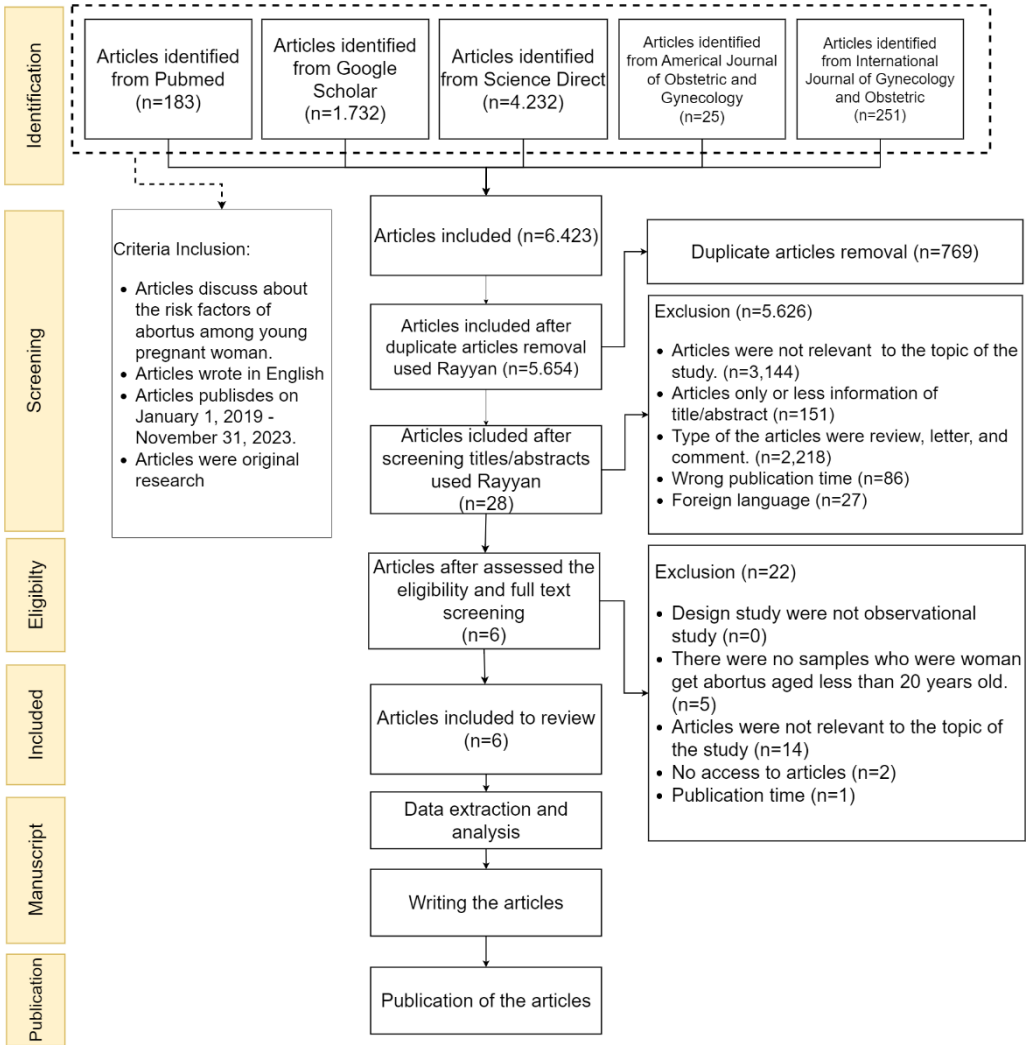

Figure 1 The flow chart of the study selection

2 in America[14,15] **(Table 2)**. All the studies reported the risk factors of abortion among young pregnant woman, but 4 articles were adjusted to age for some variable of the studies[10–12,14]2006, 2011 and 2016 was utilized. Miscarriage was defined as a spontaneous loss of pregnancy that occurred before the foetus reached 7 months of gestational age. Logistic regression analyses that adjusted for clustering, stratification and sampling weights were used to examine the association between obesity and miscarriage among women of reproductive age. Results The odds of miscarriage were 1.45 times higher (Adjusted odds ratio (AOR. The samples of the included studies were woman who had experience abortus in less than 20 years old **(Table 3)**. Based on quality assessment results used JBI Critical Appraisal Checklist, all the 6 were categorized as good **(Table 4)**

Table 2 Summary of The Characteristics of The Included Study

Characteristics	Frequency (n=6)	Percentage (%)
Study design		
Observational	6	100, %
Cross-sectional	4	66,7 %
Cohort	1	16,7 %
Case-control	1	16,7 %
Location of study		
Asia	2	33,3 %
Yaman	1	16,7 %
Nepal	1	16,7 %
Africa	2	33,3 %
Ethiopia	1	16,7 %
Sub-Sahara	1	16,7 %
America	2	33,3 %
Brazil	1	16,7 %
Michigan and Texas	1	16,7 %

Table 3 The Articles Characteristic

Author (Publication Year)	Design Study	Study Years	Study Location	Quality Assessment
Maha Abdul-Aziz, et al. (2019)	Cross-Sectional	2017	Sana'a, Yaman	GOOD
C. N. T, Oliveira, et al. (2020)	Case-Control	2017-2018	Brazil	GOOD
Tenaw Yimer Tiruye, et al. (2020)	Cross-Sectional	2016	Ethipia, Africa	GOOD
Pramesh Raj Ghimirel D., et al. (2020)	Cross-Sectional	2001, 2006, 2011, and 2016	Nepal	GOOD
James L. Mills, et al. (2019)	Cohort	2005-2009	Michigan and Texas	GOOD
Adama Baguiya, et al. (2022)	Cross-Sectional	2017-2018	11 Sub-Sahara Africa	GOOD

Table 4 Quality Assessment

Author (Publication Years)	Design Study	Percentage	Interpretation
Maha Abdul-Aziz, et al. (2019)	Cross-Sectional	75 %	Good
Tenaw Yimer Tiruye, et al. (2020)	Cross-Sectional	100 %	Good
Pramesh Raj Ghimirel D., et al. (2020)	Cross-Sectional	100 %	Good
Adama Baguiya, et al. (2022)	Cross-Sectional	62.50 %	Good
James L. Mills, et al. (2019)	Cohort	72.72 %	Good
Maha Abdul-Aziz, et al. (2019)	Case-Control	100 %	Good

Tabel 5 Risk Factors of Abortus Among Young Pregnant Woman

Author (Publication Year)	Populations	Sample Size	Age (years old)	Risk Factors	Outcomes	Conclusion
Abdul-Aziz M, et al. (2019)	Woman seeking primary healthcare in PHC centers	294	15-50	There are no immediate risk factors	Young age pregnancy has association with infection of Bacteria vaginosis (aOR = 2 (95%CI = 1.10-3.62))	There are no correlation between young woman and abortus caused by infection directly
					History of abortion is not associate with infection of Bacteria vaginosis (aOR= 0.5 (95%CI =0.26-0.81))	There are no information of caused abortus on history of miscarriage
Oliveira CNT, et al. (2020)	Woman with history of abortus and no history of abortus	109	<19 - >29	First coital at <18 years old	Coital on 16-17 years old (aOR=4.34 (95%CI = 0.75-25.25)) and less than 16 (aOR=6.128 (95%CI = 1.15-32.63))	There are significant correlation. The younger increase risk of abortus.
				Present of *U. parvum*	Present of *U. parvum* in the placental tissue (aOR = 6.46 (95%CI = 2.0–20.7))	There are significant correlation.
Yimer Tiruye T, et al. (2020)	Household woman who eligible for the interview	4.167	15-49	Experience of IPV	Experience of IPV (physical, emotional, or sexual) (aOR = 1.48 (95%CI = 1.10-2.00))	There are correlations.
				Experience of partner controlling behavior	The singe act (aOR = 1.39 (95%CI = 0.095 - 2.02)) the multiple act (aOR = 1.45 (95%CI = 1.02 - 2.02))	There are correlation. The multiple act has more risk..

Raj Ghimire P, et al. (2020)	Household woman who eligible for the interview	19.160	15-49	Maternal BMI	Underweight (aOR = 0.96 (95%CI = (0.82-1.12)), Overweight (aOR = 1.13 (95%CI = (0.95-1.34)), Obesity (aOR = 1.45 (95%CI = (1.06-1.98))	There are correlation on overweight and obesity, but there are no correlation to underweight.
				Smoking habit	Smoking habit on maternal (aOR = 1.27 (95% = 1,07-1,50))	There are correlation.
L Mills J, et al. (2019)	Couples who had discontinued contraceptive use in the last 2 months	329	18-40	Iodine deficiency	Mild deficiency (aOR = 0.69 (95%CI = 0.32-1.50)), Moderate deficiency (aOR = 0.81 (95%CI = 0.43-1.51)), Severe deficiency (aOR = 0.69 (95%CI = 0.34-1.51))	There are no correlation.
				Iodine-creatinine deficiency	Mild deficiency (aOR = 0.53 (95%CI = 0.16-1.76)), Moderate deficiency (aOR = 0.76 (95%CI = 0.41-1.40)), Severe deficiency (aOR = 0.72 (95%CI = 0.38-1.36))	There are no correlation.
Baguiya A, et al.	Woman who had history of miscarriage	9.232	Less than 19 until more than 30	Infection	Infection (aOR = 1.84 (95%CI = 1.24-2.74))	There are correlation.
				Infection with complication of abortus	Infection with complication of abortus (aOR = 1.26 (95%CI = 0.89-1.79))	There are correlation.

On 6 studies, the population divided into 5 groups, there are; 15-50 years old (1 articles)[12]the underlying causes of infectious vaginitis have been neglected. Therefore, this study aimed to determine the prevalence and risk factors associated with bacterial vaginosis (BV, less than 19 and more than 29 years old (1 articles)[19], 15-49 years old (2 articles)[13,14], 18-40 years old (1 articles)[16], and less than 19 until more than 30 years old (1 articles)[15]describe their management, and identify sociodemographic and clinical factors associated with abortion-related infections. Methods: A secondary analysis of the WHO Multi-Country Survey on Abortion-related morbidity (MCS-A. All articles adjusted to age for the studies. The risk factors of found are; infection, age of first coital, intimate partner violence (IPV), partner controlling behavior (PCB), body mass index, smoking habits, iodine sufficiency, and iodine creatinine ratio **(Table 5).**

Discussion

Infection of *Bacteria vaginosis* has increased 2 times on young age.[10]. On studies, there are no direct evidence of young woman infected of *Bacteria vaginosis* has experience abortus. The other studies found the presence of *U. parvum* in the placental tissue. *U. parvum* infection has affected to risk of miscarriage 6.46 times.[15] The risk of infection might be explained by the higher frequency of do unprotected sexual intercourse among young woman.[16]microbiologic, behavioral, and demographic data were obtained from 101 nonpregnant women at baseline and at 4 and 8 months. A total of 272 isolates of lactobacilli were identified to the species level by use of whole chromosomal DNA homology to type strains. The predominant lactobacilli were the species Lactobacillus crispatus (38% The immune system contributed on implantation preparation. The implantation process induces inflammatory response because of invasion and damage of maternal tissue. Infections on vagina could activate the macrophage to the vagina and it lead associate with abnormal implantation. This abnormality result to the miscarriage.[5] Beside, history of miscarriage would increase woman's awareness to their pregnancy, so the possibility to get infection after miscarriage was 0.5 times.[10]

First coital were associate with miscarriage. The first coital at 16-17 years old has 4.34 times to risk of miscarriage and the first coital at less than 16 years old has increased the risk as 6.128 times.[15] This caused by the immune system on puberty still on maturation. The oestrogens and androgens directly contribute to the immune system maturity. This hormonal changes due to puberty caused young woman more vulnerable to the external stimulations such as infection.[5]

Body Mass Index (BMI) also associate with pregnancy outcomes. The underweight young pregnant woman (BMI <18.5 kg/ m^2) decreased the risk of miscarriage as 0.96 times. Whereas, the overweight young pregnant woman (BMI = 23-27.49 kg/m^2) has increased 1.13 times risk of miscarriage and the obesity woman (BMI >25.5 kg/ m^2) has increased 1.45 times. The obesity increased the comorbid of non-communicable disease such as diabetes, thus increasing the complications in the pregnancy such as preeclampsia. This associated with restricted fetal growth such as placental abruption. This abnormality could make the fetal not get the nutrition needed for its development. [12 19]

Maternal tobacco smoking habit has effected the miscarriage. On the study, smoking habits has 1.27 times increased the risk of miscarriage. The other risk factors of abortus also increased when the woman is smoking during pregnancy.[12] Carbon monoxide in tobacco could inhibited the fetal from getting enough oxygen and lead to vasoconstrictive. This resulting the placental insufficiency and lead to miscarriage.[20]

Beside the internal factors of the woman, the external factors has related to miscarriage. IPV such as physical, psychological, or sexual harm are associate 1.54 times the risk miscarriage.[11] The partner reproductive coercion such as forced sexual activity, contraception, and get pregnancy have disturbing the wive decision making on their fertility. That forces lead to unwanted pregnancy for the woman, this associated to terminated pregnancy.[21]

The forced from the partner is classified as partner controlling behavior (PCB), the single act of PCB has 1.38 times increased the risk of miscarriage and the multiple has 1.72 times increased the risk of miscarriage. The controlling behavior was the endemic nature with cultural context.[22] The feel of shameful of has early pregnancy child, the parents forced their children to marriage at young age.[23]

Iodine level on maternal has not significant roles to miscarriage. Mild deficiency of iodine (100-149 µg/L) has 0.69 times to risk of miscarriage and moderate iodine deficiency (50-99 µg/L) that has risk as 0.81 times. Whereas, the severe iodine deficiency (<50 µg/L) has decreased the risk of miscarriage as 0.69 time. Iodine creatinine ratio also has not significant the risk of miscarriage.[14] The iodine deficiency has results on inadequate thyroid hormones production. The hormones is required for neuronal migration and myelination of the fetal brain. The most severe manifestation of utero iodine deficiency is cretinism.[24]

So that, Word Health Organization (WHO) reported that iodine deficiency is the risk factors of miscarriage, but WHO reveals that the investigations had severe limitations for examining miscarriage.[14]

This study is the first review of descriptive risk factors for abortion among young women (less than 20 years old). This review has identified some factors that affect spontaneous abortion. This review also has limitations. The database used had thousands of articles, but the available downloads were limited. The articles reviewed have different risk factors for miscarriage, so each factor can't be compared to get the general result.

Conclusion

In conclusion, abortus among young pregnant woman has several risk factors. The risk have different significances to spontaneous abortus. This review shows the most associated risk factors to spontaneous abortus is infection of *U. parvum* and coital at less than 16 years old. The other factor that has significant to abortus among young pregnant woman were infection of *Bacteria vaginosis*, intimate partner violence, partner controlling behavior, body mass index, and maternal smoking habit. The limitation on this study was the different variable on each study, so we couldn't compared every variable to get a general view of the study.

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