ORIGINAL ARTICLE

The Influence of Hormonal Contraceptive Risk Factors on the Incidence of Preeclampsia

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ABSTRACT

Introduction: Preeclampsia is one of the causes of maternal death. The prevalence of preeclampsia cases in Indonesia is quite high, namely 34.1%. One of the risk factors for preeclampsia is a history of using hormonal contraception. For this reason, this study aims to know the influence of hormonal contraceptive risk factors on the incidence of preeclampsia. **Materials and methods:** This research was a case control analytical observational study. Samples were 24 cases and 24 controls. The independent variable was hormonal contraception, and the dependent variable was preeclampsia. Data was collected through medical records at the Pangkur Community Health Center, Ngawi Regency. Chi-square analysis test with a significance level of P<0.05. **Results:** The results of this study indicated that exposure to hormonal birth control for the incidence of preeclampsia was 66.6%, while exposure to hormonal Contraception for non-preeclampsia events was 25%. From the results of the analysis with the Chi-Square test, the significance value of P = 0.009. **Conclusion:** It can be concluded that there was an influence of hormonal contraceptive risk factors on the incidence of preeclampsia. It's recommended that potential acceptors undergo counseling before making a decision by looking at the short-term and long-term effects.
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Keywords: Hormonal, Contraception, Preeclampsia, Risk factor, Incidence

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INTRODUCTION

Maternal mortality is the result of the interaction of various aspects both clinical aspects, behavioral aspects, system aspects, health services as well as non-health factors and the implementation of the healthcare system optimal (1). Indonesia's high maternal mortality rate over the past three decades has not been able to be suppressed. It takes work with all parties considering that the trigger for maternal death is not only a matter of health, but also culture, religion, and infrastructure. Globally, the five leading causes of maternal death are hemorrhage, preeclampsia and eclampsia, infection, long/stuck partus and abortion (2). Preeclampsia and Eclampsia in pregnancy is still a big challenge in Indonesia because it is often found as new cases as well as old cases during routine pregnancy care. The prevalence of preeclampsia cases is quite high, which is 34.1% according to the data Riskesdas 2018 (3). Preeclampsia and eclampsia are increasing in proportion, almost 30% of maternal deaths in Indonesia is caused by Preeclampsia and eclampsia. The high number of cases is influenced by the way of early detection of signs of preeclampsia that are not serious and the behavior of pregnant women who tend to be less able to manage stressors well though effective drugs are widely available. Based on data (2), MMR in East Java tends to increase in the last two years.

Year 2016 AKI amounted to 91/100,000 live births and increased to 91.92/100,000 live births in 2017. Three the causes of maternal death in East Java are; Preeclampsia/eclampsia is 28.92% or as many as 163 people, and bleeding is 26.28% or as many as 19 people, the rest is a collection of other causes (2). Prevalence Preeclampsia in Ngawi Regency in 2016 was 427 people, and increased to 479 in 2017. Maternal deaths due to severe preeclampsia also increased, from 3 maternal deaths in 2016 to 8 maternal deaths in 2017. In the UPT Puskesmas Pangkur area, Ngawi Regency in 2016, the number of cases of PEB amounted to 15 people or 22.05% of 68 high-risk pregnant women, with the number of maternal deaths of 1 person. In 2017 the number of PEB cases increased to 24 people or 24.8% of 115 high-risk pregnant women. It shows a significant increase in PEB cases occurring in Ngawi District in general and in UPT Puskesmas Pangkur area in particular (4).

The cause of preeclampsia is multiple caution, meaning that there are many causative factors but not there is one definite cause. The theory that today is widely put forward as the cause of preeclampsia is ischemia placenta (5). Factors that are often found as risk factors include nullipara, multiple pregnancy, low age from 20

years or more than 35 years, have a history of heredity, and obesity. But among the factors, it is often difficult to find which is the cause and which is the effect (6). Others mention that the risk of preeclampsia can occur in women aged < 20 years or > 35 years, diabetes mellitus, chronic hypertension, hormonal birth control users, fetal abnormalities (7). Other sources mention that pregnant women less than 20 years old (56.5%), primipara and grande multipara (52.7%), and pregnant women with a history of preeclampsia and eclampsia (55.6%) are risk factors for preeclampsia.

Age factors influence the occurrence of preeclampsia. The age of 20-30 years is the safest age for pregnant/ giving birth, but in developing countries 10% to 20% increased incidence of preeclampsia increased 2-3 times in grande aged 40 years when compared to aged 25-29 years (1), in addition repeated labor will have many risks to pregnancy, it has been proven that the second delivery is the safest delivery. History of hormonal contraceptive use is one of the risk factors for preeclampsia. Research shows that contraceptive use hormonal increases thromboembolism and cerebral vascular disorders (8–10). Use of hormonal contraception can increase the risk of high blood pressure (11). It is mentioned that women who are taking hormonal contraceptives there is an increase in systolic and diastolic blood pressure, especially in the first two years of use (12).

At working area of UPT Puskesmas Pangkur, Ngawi Regency, the number of uses of hormonal birth control from year to year year has increased, in 2016 the number of Hormonal KB users was 2960 people, in 2017 the number of hormonal birth control users experienced an increase of 2988 people, consisting of pills, injections, implants. It is comparable to the incidence of preeclampsia which from year to year has increased. Preeclampsia and eclampsia is a risk that harms the mother in addition to harming the fetus through the placenta. Every year about 50,000 mothers die from eclampsia (5). Some cases show a condition that remains mild throughout pregnancy. In the late stage called eclampsia, the patient will have seizures. If eclampsia is not treated promptly, there will be loss of consciousness and death due to heart failure, kidney failure, liver failure or brain hemorrhage (7).

Preeclampsia and eclampsia are the biggest causes of maternal death besides hemorrhage, both reasons can be prevented with adequate antenatal care (ANC) or with services quality with established service standards. Antenatal Care is one way of detecting early onset of a disease in pregnancy (5). In addition, integrated ANC and laboratory tests for all pregnant women, the use of high risk detection bracelets (red bracelets for pregnant women with a PR score of ≥ 10, green bracelet for pregnant women with a PR score of ≤ 10), foster parent program for pregnant women with SEZ, anemia, incapable PEB is a breakthrough program to detect the presence of high risk in pregnancy. The purpose of this study was not to reduce the incidence of preeclampsia or reduce maternal mortality, but rather emphasized efforts to determine the predisposing factors of preeclampsia cases from risk of the use of hormonal birth control. The issues raised in this study are still relevant to the current situation because of the numbers the use of hormonal birth control both injectable and pills contraceptives is very high, on the other hand cases of preeclampsia also tend to increase. If it is known / suspected that the use of hormonal birth control provides a high risk of preeclampsia, then the incidence of preeclampsia of pregnancy can be suppressed.

The general purpose of this study is to determine the effect and risk of exposure to birth control use hormonal against the incidence of preeclampsia in the Puskesmas Pangkur Area, Ngawi Regency. Purpose specifically by calculating the proportion of hormonal birth control exposure from the preeclampsia maternal group and the proportion of hormonal birth control exposure from the non-preeclampsia maternal group, analyzing the effect of hormonal birth control exposure on the incidence of preeclampsia and knowing the risk of hormonal birth control exposure to the incidence of PE.

MATERIALS AND METHODS

Type of observational analytical research with case control design. The study was conducted by comparing the case group (pregnant women with PE) and the control group (pregnant women without PE). The selection of subjects was based on the incidence of PE, then observations were made on the history of exposure to research factors (use of hormonal contraceptives) or not. This research was conducted at Puskesmas Pangkur Ngawi in March 2019. The population of this study were all pregnant women recorded at the Puskesmas Pangkur in 2018. The sample of this study was recorded at Puskesmas Pangkur in 2018 with 24 cases and 24 controls. The independent variable is hormonal birth control and the dependent variable is preeclampsia. The research instrument was a tabulation sheet of maternal and child health medical records. The Chi-Square test was used in this research.

Ethical Clearance

This study was approved by Research Ethics Committee, University of Muhammadiyah Surakarta No: 265/FH/A.3-II/II/2019.

RESULTS

Proportion Of Hormonal Birth Control Exposure From Preeclampsia And Non-Preeclampsia Pregnant Women

Table I: Proportion of hormonal birth control exposure from preeclampsia and non-preeclampsia pregnant women

Contraception	Pre eclampsia		Total
	Yes	No	
Hormonal	16 66,7%	6 25%	22
Non Hormonal	8 33,3%	18 75%	26
Total	100%	100%	48

Based on the results of the study in table 1, the proportion of hormonal birth control exposure from preeclampsia pregnant women based on the formula Pı = a / (a + c) is 66.7% or 0.66, while the proportion of hormonal birth control exposure from non-preeclampsia pregnant women based on the formula P2 = b / (b + d) is 25% or 0.25.

The Effect Of Hormonal Birth Control On The Incidence Of Preeclampsia

Table II: Chi-Square Test Results of the effect of hormonal birth control on the incidence of Preeclampsia

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.392[a]	1	.004

Based on Table II, the results of the chi-square test obtained X count = 6.797 df = 1 with a significant value p = 0.004. The significance value of P = 0.004 < 0.05 then H0 is rejected, meaning that there is an effect of hormonal birth control exposure on the incidence of preeclampsia.

Risk of Exposure to Hormonal Birth Control on the Incidence of Preeclampsia

Table III: Mantel-Haenszel Common Odds Ratio Estimate Risk of Exposure to Hormonal Birth Control on the Incidence of Preeclampsia

Estimated		6.000
Common Odds Ratio	Lower Limit	1.711
	Upper Limit	21.038
Confidence level 95%		
ln(Common Odds Ratio)	Upper Limit	.537
	Lower Limit	3.046

Based on Table III, the OR value = 6 at a confidence level of 95% means that the administration of hormonal birth control has a 6 times greater risk of preeclampsia during pregnancy compared to non-hormonal birth control participants.

DISCUSSION

Proportion Of Hormonal Birth Control Exposure From Preeclampsia And Non-Preeclampsia Pregnant Women

Based on the results of the above study, it was found that the proportion of exposure to hormonal birth control was more people who experienced preeclampsia than did not experience preeclampsia in pregnancy. This is reinforced by research conducted at Balen Health Center, Bojonegoro Regency, showing that mother pregnant women belonging to the case group (50 respondents who experienced preeclampsia) were more likely to use contraception hormonal, namely 38 people with a percentage of 76.0% (13). Hormonal contraceptives (HC) are thought to play a role in the pathogenesis of cardiovascular diseases. The study evaluated the use of HC as a primary cause of preeclampsia (PE) among Ghanaians. This study comprised 30 preeclamptic women and 30 healthy normotensive pregnant women with over 20 weeks of gestation at the Comboni Hospital, Ghana using a randomized case-control study. This study was carried out in 2019. 80.0% of women with PE used the hormonal contraceptive "depot medroxyprogesterone acetate" (DMPA) prior to pregnancy (14).

Research conducted by Zamanй, H., et al. stated that the incidence of preeclampsia in contraceptive users was 4.2%, in contraceptive implant users 1%, and in contraceptive injection users 0.97% (15). Another theory states that hormonal birth control mostly contains the hormones estrogen and progesterone, where these two hormones are regulated so that they are close to hormone levels in the acceptor's body. The hormone estrogen has the ability to facilitates sodium ion retention and water secretion accompanied by increased plasma rennin activity and the formation of angiotensin which causes an increase in blood pressure and the onset of oedema due to water retention in the body so that when pregnant women can trigger preeclampsia (15). Exposure hormonal birth control to the incidence of preeclampsia occurs because synthetic estrogen and progesterone hormones in hormonal birth control cause an imbalance of natural estrogen and progesterone hormones in the body and disruption of the rennin angiotensinogen system that triggers disorders of blood vessels causing blood pressure to rise, if this takes place during pregnancy it can cause the occurrence of preeclampsia.

Based on the research results of Setyawati (16), it shows that there is a significant relationship between history of hormonal contraceptive use and the incidence of preeclampsia with a value of p=0.048. The use of contraception before pregnancy has a significant effect

on the incidence of preeclampsia in these individuals. Hormonal contraception in the form of birth control pills mostly contain the hormones estrogen and pregesterone. The hormones in contraception have been regulated in such a way that they approach the hormone levels in the acceptor's body. However, if used for a long period of time it will cause other side effects. These two hormones have the ability to facilitate the retention of sodium ions and water secretion accompanied by an increase in plasma renin activity and the formation of angiotensin, which can trigger an increase in blood pressure (13).

The Effect of Hormonal Birth Control on the Incidence of Preeclampsia

The results of the Chi-Square test show that there is an influence of hormonal birth control risk factors on the incidence of preeclampsia. This fits with the theory that one of the signs of preeclampsia is increased blood pressure, oedema and urine protein (8). Increased blood pressure or hypertension in pregnant women can occur one of them because of a history of hormonal birth control use before pregnancy, where hormonal birth control has the composition of the hormones estrogen and progesterone. Synthetic estrogen and progesterone hormones in hormonal birth control will cause natural estrogen and progesterone levels in the blood to remain high, so that the feedback mechanism will work and the Renin Angiotensin Aldosterone system in the body will be disrupted. This estrogen hormone's presence can increase angiotensinogen levels which will cause vasoconstriction and increase Aldosterone. This aldosterone can cause sodium retention which increases blood volume. The influence of hormonal birth control risk factors on the incidence of preeclampsia is caused by the presence of synthetic estrogen hormones in hormonal birth control which results in disruption of the angiotensinogen renin system. So that vasoconstriction occurs in blood vessels and an increase in blood volume, which results in an increase in blood pressure. Conditions like this if continued when pregnant women will trigger the occurrence of preeclampsia (17).

Risk of Exposure to Hormonal Birth Control on the Incidence of Preeclampsia

Mothers with a history of hormonal birth control use before pregnancy have a 6 times greater risk of occurring preeclampsia during pregnancy compared to non-hormonal birth control users. This is in line with theory that Hormonal KB acceptors who experience hypertension while using Hormonal KB can experience hypertension returns when the acceptor is pregnant, strengthened the theory that hypertension in Preeclampsia can occur due to a long history of hormonal contraceptive use/>2 years. This is in accordance with research that hypertension and edema in preeclampsia occur 2-3 times more often in women who use hormonal contraceptives, especially orally (8).

Routine and prolonged administration of synthetic estrogens has a tendency to activate angiotensin and administer fewer synthetic estrogens does not have a tendency for angiotensin to activate, angiotensin activation that lasts a long time and continuously will cause angiotensin activation to be abnormal so that the angiotensin aldosterone rennin system becomes disrupted, this can be the cause of increased blood pressure and retention water. The risk of hypertension increases according to the long duration of hormonal birth control use, this is due to the increasing the length of time a woman of childbearing age uses hormonal birth control, then the levels of the synthetic hormone estrogen in the body will the more and more likely the disruption of the natural estrogen hormone system and the rennin angiotensinogen system in the body is also greater, the greater the risk of preeclampsia in pregnancy.

CONCLUSION

Based on research conducted at UPT Puskesmas Pangkur, Ngawi Regency shows that the proportion of exposure to hormonal birth control history is more preeclampsia than nonpreeclampsia in pregnancy, there is a statistically significant influence between hormonal birth control risk factors and the incidence of preeclampsia and mothers with a history of hormonal birth control have a greater risk of preeclampsia in pregnancy compared to mothers who do not use hormonal birth control. From the results of the study, it is recommended to reduce the incidence of preeclampsia in pregnancy: 1. increase the use of non-hormonal contraceptives from hormonal contraceptives, 2. mothers with a history of long-term hormonal contraceptive use must be more closely supervised because they have a higher risk of developing preeclampsia.

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