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Correlation Between History of Birth Control Usage and Incidence of Gingivitis among Pregnant Women in Ambulu Public Health Center, Jember District

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ABSTRACT

Using birth control (BC) can affect gingiva tissue, increasing the risk of developing gingivitis among women of reproductive age. Based on the Central Bureau of Statistics census, in 2021 61,77% of women in their reproductive age have used contraception and birth control in East Java. This study aims to find the correlation between the history and birth control usage and the incidence of gingivitis among pregnant women in Ambulu Public Health Center. This study uses a cross-sectional method with an analytical observational approach on pregnant women who visited the Dental Outpatient and received dental examinations in April and May of 2022. Thirty respondents were gathered with a history of birth control usage and evaluated using the dentist's Periodontal Index (PI). The results show that nine respondents (30%) had no history of using BC, two respondents (6.6%) used BC pills, ten respondents (33.3%) used 1-month injection BC, five respondents (16.6%) used 3-month injection BC, two respondents (6.6%) used implants BC and two respondents (6.6%) used IUD. From the cross table, one respondent (3.3%) was in the normal category, 1 respondent (3.3%) was in the simple gingivitis category, 15 respondents (50%) were in the early destructive periodontal disease category, and 13 respondents (43.4%) were in the destructive periodontitis. The data are analyzed using Chi-square result, showing that the significant value is p = 0,049 (p<0,05), so it can be concluded there is a significant relation between history of birth control usage and incidence of gingivitis in Ambulu Public Health Center. Dental and oral examinations are highly recommended in routine as early detection of health problems among pregnant women.

Keywords: birth control, gingivitis, pregnant women

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1.BACKGROUND

Implementing the Family Planning (KB) program is one of the government's efforts to control population growth through several methods, such as using contraceptives in the form of family

planning used by women of childbearing age. Based on the results of the BPS census in 2021, 61.77% of women of childbearing age have used contraceptive methods in East Java Province. Contraceptives are divided into two types, namely hormonal contraceptives and non-hormonal contraceptives. Hormonal contraception includes oral contraceptives containing the hormones estrogen and progesterone, injections, and implants containing only progesterone. Non-hormonal contraception is a type of contraception that does not contain additional hormones, such as condoms, intrauterine devices (IUDs), IUDs, and tubectomy. Based on the report "Indonesian Youth Statistics 2021", injectable birth control was the most widely used method covering 66.49%; pill contraception covered 15.55%; implant contraception covered 8.85% and 7.08% using IUDs and IUDs. The use of hormonal birth control is still the choice of contraception by most women of childbearing age in Indonesia (Mardiati, Subekti, Donasari, & Oktaviani, 2020).

Periodontal disease is a dental and oral disease that occurs due to the activity of bacteria and the body's hormones. Periodontal diseases are divided into two categories, namely gingivitis, and periodontitis (Sathish, Varghese, & Fernandes, 2022). Gingivitis is the initial stage of the development of periodontitis which is characterized by inflammation of the gingival tissue around the teeth which will develop into periodontal pockets. This condition is characterized by swollen tissue, redness, and bleeding easily (Massoni et al., 2019). The causes of gingivitis are divided into two factors: the main and predisposing factors. The leading cause of gingivitis is the accumulation of microorganisms that cause the growth of colonies that form dental plaque that sticks around the margins of the gingiva. Predisposing factors for gingivitis include dental caries, piles of food debris, unsuccessful dental restorations, inappropriate dentures, and orthodontic products, irregular tooth arrangements, and systemic factors such as nutrition, hormones, hematology, and drug use (Chapple et al., 2018).

Hormonal factors such as the use of birth control containing progesterone and estrogen can affect the condition of the periodontal tissue by increasing the sensitivity of the gingival tissue to dental plaque (Massoni et al., 2019). Using contraception containing the hormones estrogen and progesterone can change the hormonal conditions in the periodontal tissue, which causes inflammation. Common oral manifestations of increased progesterone and estrogen hormones are

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increased gingival inflammation and exudate discharge (Prachi et al., 2019). Increased hormones can also stimulate gingival fibroblast proliferation. Inflammation of the gingival tissue is more common in women with a history of hormonal contraception compared to other types of contraception. The hormones progesterone and estrogen also impact decreasing the response of the gingival tissue and oral cavity and changes in the population of microorganisms and feelings of discomfort in the mouth (Alrumayh et al., 2021).

The use of hormonal contraception results in increased permeability of blood vessels in peripheral tissues and is one of the causes of the expansion of inflammatory lesions, which exacerbate chronic inflammatory conditions in the gingival tissue (Kashetty, Kumbhar, Patil, & Patil, 2018). Increased levels of the hormones progesterone and estrogen also impact the response of the gingival tissue to local irritation due to decreased function of gingival mast cells. Levels of the hormones progesterone and estrogen in the blood plasma also influence the severity of inflammation. When inflammation occurs, redness and swelling of the gingival margin will appear at different levels, accompanied by changes in the shape of the teeth (Mardiati et al., 2020).

Based on data from a preliminary study at the Dental Clinic at the Puskesmas, most pregnant women with a history of using family planning experience gingivitis to varying degrees. Based on the description above and the facts in the field, examining the relationship between the history of family planning use and the incidence of gingivitis at the Ambulu Health Center, Jember Regency is necessary.

2. METHODS

This research is an analytic observational study with a cross-sectional approach. The research was conducted in the working area of the Ambulu Health Center from April to May 2022. The study used dental examinations by dentists at the Ambulu Public Health Center. It categorized conditions using the PI (Periodontal Index) to determine the effect of a history of oral contraceptives, injections, implants, and IUDs on the incidence of gingivitis in pregnant women at the Ambulu Health Center. The sampling technique used an accidental sampling of 30 respondents according to the criteria of inclusion, exclusion, examination results, and history of use of family planning. The data in the study were analyzed using the Chi-square comparative analysis test to see the relationship

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between the history of birth control use and the incidence of gingivitis.

To prevent ethical problems during the research process, this study complied with standard procedures and received ethical approval granted by the Ethics Committee for Health Research, Faculty of Dentistry, the University of Jember with an Ethical Certificate Number: No. 794/UN25.8/KEPK/DL/2022.

3. RESULTS

Table 1. Distribution of Respondents Based on Age (N=30)

Age	Frequency	Percentage (%)
16 – 20 year	6	20%
21 – 25 year	8	26%
26 – 30 year	11	36,4%
31 – 35 year	4	13%
36 – 40 year	1	3,3%

The average age of the research respondents who were the most numerous was the age group of 26-30 years, with a total of 11 people (36.6%), while the age group with the least number was the age group of 36-40 years with one person (0.3%).

Table 2. Distribution of Respondents Based on Gestational Age (N=30)

Gestational Age (Trimester)	Frequency	Percentage (%)
1st Trimester	0	0%
2nd Trimester	3	10%
3rd Trimester	27	90%

Based on the examination results, 27 respondents (90%) were pregnant women in the third trimester of pregnancy, while three respondents (10%) were in the second trimester of pregnancy.

Table 3. Distribution of Respondents Based on Types of Contraception (N=30)

Types of Contraception	Frequency	Percentage (%)
Not Using Contraception	9	30%
Pill	**2**	**6,6%**
Injections per 1 month	10	33,3%
Injections per 1 month	**5**	**16,6%**
Implant	2	6,6%
Intrauterine device (IUD)	**2**	**6,6%**

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Based on the examination results, nine respondents (30%) had no history of contraception use, ten respondents (33.3%) had a history of using injectable contraception per 1 month, five respondents (16.6%) used injectable contraception per 3 months, two respondents (6.6%) had a history of using pill contraception, 2 (6.6%) respondents used implant contraception and two respondents (6.6%) used IUD contraception.

Table 4. Distribution of Respondents Based on Gingivitis Examination Results (N=30)

Gingivitis Examination Results	Frequency	Percentage (%)
Normal	1	3,3%
Simple Gingivitis	1	3,3%
The Beginning of Destructive Periodontal Disease	15	50%
Destructive Periodontal Disease	13	43,4%
End Stage Disease	0	0%

Based on the results of dental examinations, one respondent (3.3%) was in the normal category, one respondent (3.3%) was in the simple gingivitis category, 15 respondents (50%) were in the category of beginning destructive periodontal disease, and 13 respondents (43.4 %) fall into the category of destructive periodontal disease.

Table 5. Cross-tabulation of respondents based on the type of contraception used and the severity of Gingivitis

		Gingivitis				Total
		Normal	Simple Gingivitis.	The Beginning of Destructive Periodontal Disease	Destructive Periodontal Disease	
Types of Contraception	Not Using Contraception	1	0	6	2	9
	Pill	0	0	0	2	2
	Injections per 1 month	0	0	3	7	10
	Injections per 1 month	0	0	4	1	5
	Implant	0	1	1	0	2
	Intrauterine device (IUD)	0	0	1	1	2
	Total	1 (3.3%)	1 (3.3%)	15 (50%)	13 (43,4%)	30 (100%)

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Based on the results of cross-tabulation of the history of contraceptive use with the incidence of gingivitis, in the group that did not use contraception, one respondent (3.3%) was in the normal category, six respondents (20%) were in the category of onset of destructive periodontal disease and two respondents (6.6 %) in the category of destructive periodontal disease. In the group with a history of pill contraception, two respondents (6.6%) had destructive periodontal disease. In the group with a history of using injectable contraception for one month, three respondents (9.9%) were in the category of onset of destructive periodontal disease, and seven respondents (23.3%) were in the category of destructive periodontal disease. In the group with a history of using injectable contraceptives for three months, there were four respondents (13%) with the onset of destructive periodontal disease and one person in the category of destructive periodontal disease. In the group with a history of using contraceptive implants, one respondent (3.3%) had simple gingivitis, and one respondent (3.3%) had the onset of destructive periodontal disease. In the group with a history of IUD contraceptive use, one respondent (3.3%) was found in the onset of destructive periodontal disease, and one respondent (3.3%) was in the category of destructive periodontal disease.

Table 6. Chi-square Correlation Test Results History of Use of Contraception with Incidence of Gingivitis

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	25.097[a]	15	.049
Likelihood Ratio	18.099	15	.258
Linear-by-Linear Association	.081	1	.777
N of Valid Cases	30		

a. 23 cells (95.8%) have an expected count less than 5. The minimum expected count is .07.

Based on the results of data analysis using the Chi-square method, a significance value of 0.049 (‹0.05) was obtained.

4. DISCUSSION

The study was conducted in the working area of the Ambulu Health Center, Jember Regency, to find a relationship between contraceptive use and the incidence of gingivitis. Several studies are

showing that there is a relationship between the use of hormonal contraception, such as pills and injections, which increases the risk of gingivitis in women of childbearing age. In this study, some data were found, which were divided based on the type of contraception used and the incidence of gingivitis in each type of contraception.

Gingivitis in Pregnant Women Without Family Planning History

Hormonal conditions in women of childbearing and pregnant women can affect periodontal health. When entering the fertile period, women will experience an increase in reproductive hormones, such as progesterone and estrogen, which increase blood circulation to the gums. This increased circulation impacts the gums' sensitivity, making them more at risk of experiencing irritation and inflammation (Pontoluli, Khoman, & Wowor, 2021). Gingivitis can occur during the menstrual cycle due to changes in the hormonal cycle. During pregnancy, changes in hormones, especially progesterone, also increase blood flow to the periodontal tissues, which reduces the strength of the tissues, making them more at risk for endothelial damage, and increases the permeability of blood flow. The process of pregnancy is not the leading cause of gingivitis but can exacerbate existing health problems by increasing the inflammatory response (Castro et al., 2021).

In this study, out of 9 respondents with no history of contraception use, one respondent was in the normal category, six were in the early destructive periodontal disease category, and two were in the destructive periodontal disease category. This condition can be caused by pregnant women's oral and dental hygiene patterns during and before pregnancy and the hormonal changes that naturally occur during pregnancy. Gingivitis can start from dental health that is not maintained and exacerbated by inadequate dental and oral hygiene maintenance behaviors.

Gingivitis in Pregnant Women with a History of Using Oral Contraception

Oral contraceptives are a type of contraception that women of childbearing age widely use. Currently, oral contraceptives circulating in the community contain low doses of estrogen and progestin, as much as 0.05 mg/day for estrogen and 1.5 mg/day for progestin. Many studies have shown a negative impact of oral contraceptives on periodontal health due to the dose and duration of use. Long-term use of oral contraceptives increases the risk of

developing periodontal disease due to increased production of cytokines and prostaglandins due to hormonal changes (Prachi et al., 2019). Based on the study results, two respondents fall into the category of destructive periodontal disease. This is in line with the theory that a history of long-term use of oral contraceptives increases the risk of developing gingivitis in women of childbearing age and pregnant women.

Gingivitis in Pregnant Women with a History of Injecting Contraceptive Use 1 Month and 3 Months

Contraceptives in the form of injections for months contain depot medroxyprogesterone acetate (DMPA). The administration of DMPA is effective in providing long-term contraception given by intramuscular injection. DMPA works by suppressing gonadotropin secretion, inhibiting estradiol production, and preventing follicles in the ovaries from developing and ovulating. However, several studies state that the use of DMPA is associated with increased changes in periodontitis tissue that impact gum bleeding. This condition is caused by the progestin hormone, which allegedly has components that cause inflammation and prostaglandin production, so long-term use has an impact on increasing the risk of disease in the periodontal tissue (Kashetty et al., 2018).

A study by Bagheri, Tadayon, Afshari, Jahangirneghad & Haghighizadeh (2016) explains that women who use DMPA injections experience gingivitis with deeper pockets of infection, loose teeth, bleeding during examination, and periodontitis, so it can better explain the impact of using DMPA on periodontal tissue health.

This study showed that severe gingivitis was found in respondents with a history of using contraception for one month, including three respondents in the onset of destructive periodontitis and seven respondents in the category of destructive periodontitis. In the group using 3-month injection contraception, four respondents were included in the onset of destructive periodontal disease category, and 1 respondent was in the category of destructive periodontal disease. This condition is in line with the theory that the use of DMPA in the long term has an impact on an increased risk of gingivitis and other periodontal problems.

Gingivitis in Pregnant Women with a History of Implant Contraceptive Use

Implant contraception contains the hormone progesterone, which works by thickening the mucus on the cervix and

thinning the lining of the uterus so that sperm cannot pass through the cervix. An increase in the hormone progesterone impacts increasing tissue sensitivity, one of which is periodontitis. Several enzyme mechanisms that metabolize progesterone are also found in the gingiva and components that cause inflammation. The metabolism of the hormone progesterone and the change of estrogen to estradiol occurs more rapidly in gingival tissue already experiencing swelling. The hormone progesterone in contraception can also increase the speed of folate metabolism in the oral mucosa so that it has an impact on repairing damaged tissue and increasing the production of prostaglandins, thereby worsening the condition of gingivitis.

In this study, one respondent (3.3%) in simple gingivitis and one respondent (3.3%) in the onset of destructive periodontal disease category. Compared to pregnant women with a history of using oral and injectable contraceptives, the number of respondents who experienced gingivitis problems in the implant group was less with a milder degree.

Gingivitis in Pregnant Women with a History of IUD Contraceptive Use

Contraceptive Intrauterine Devices (IUDs) are one of the most effective types of contraception, with a failure rate of 0.08%, so this tool has an effectiveness of more than 99% in preventing pregnancy. IUDs are divided into two types: IUDs containing levonorgestrel and copper IUDs. It can be used in the long term, namely 3-5 years (Lanzola & Ketvertis, 2022).

In this study, in the group with a history of IUD use, one respondent (3.3%) was included in the onset of destructive periodontitis category, and one respondent (3.3%) was included in the category of destructive periodontitis.

5. CONCLUSION

This study shows that gingivitis in the moderate and severe categories occurs mainly in pregnant women with a history of hormonal contraception, especially monthly injectable contraception. This suggests that the hormone progesterone is one of the main factors in the pathogenesis of gingivitis, and high concentrations affect the exaggerated response of the gingival tissue to inflammation and dental plaque. Based on the results of research conducted during April - May 2022 in the work area of the Jember Ambulu Health Center, the significant results obtained from the Chi-square test were 0.049 (<0.05), so it can be concluded that there is a significant effect

of history of family planning use on the incidence of gingivitis in the work area of the Public Health Center Ambulu.

From the results of this study, it is hoped that the high number of events associated with a history of family planning use in pregnant women can increase attention and awareness to check health conditions by carrying out routine dental and oral examinations as early detection of health problems in pregnant women.

AUTHOR CONTRIBUTIONS

Substantial contributions to conception, data collection, and analysis: Nadia Dian Rosanti, Dinar Rizqi Perwitasari, Renidya Asyura Muttabi Deya Fa'ni. Writing: Nadia Dian Rosanti, Dinar Rizqi Perwitasari. Manuscript revisions: Nadia Dian Rosanti and Renidya Asyura Muttabi Deya Fa'ni.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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