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THE RELATIONSHIP BETWEEN HORMONAL CONTRACEPTIVE USE AND PREDIABETES IN GAMPONG JAWA, LANGSA CITY

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ABSTRACT

The use of hormonal contraceptives remains the primary choice for couples of reproductive age (CRA) in Indonesia, including in Gampong Jawa Village, Langsa City, with a prevalence of 60.55% out of a total of 1,192 CRA couples. The use of hormonal contraceptives requires attention as it is suspected to affect blood glucose levels and pose a risk of developing prediabetes. This study aims to determine the relationship between hormonal contraceptive use and the incidence of prediabetes among family planning acceptors in Gampong Jawa Village, Langsa City in 2025. This research employed a descriptive-analytical design with a cross-sectional approach, involving 30 respondents selected through accidental sampling technique. Data were analyzed using chi-square statistical tests to determine the relationship between variables. The research findings indicate that blood glucose levels in contraceptive pill users are not associated with prediabetes (p-value = 0.251 > 0.05), while injectable contraceptives are associated with prediabetes (p-value = 0.042 < 0.05). Meanwhile, implant contraceptives could not be tested due to the limited number of respondents. Duration of hormonal contraceptive use ≥ 2 years also showed a significant relationship with the incidence of prediabetes (p-value = 0.046 < 0.05). The conclusion of this study is that there is a relationship between hormonal contraceptive use, particularly injectable contraceptives and duration of use ≥ 2 years, with the incidence of prediabetes. Therefore, it is recommended that women of reproductive age regularly monitor their blood glucose levels, and healthcare providers should enhance education and supervision of hormonal contraceptive acceptors.

Keywords: *Hormonal contraception; Prediabetes; Blood glucose;*

INTRODUCTION

The use of contraceptives is one of the important reproductive health interventions in reducing maternal morbidity and mortality rates worldwide. The World Health Organization (WHO) reported that the use of modern contraceptives has increased over the past six years, with the highest proportion in Latin America and the Caribbean (67.0%) and Asia (61.6%), but still low in Sub-Saharan Africa (27.6%) (Putri & Mutiah, 2022). Nevertheless, approximately 225 million women in developing countries still have unmet contraceptive needs due to limited method choices and side effects from contraceptive use (Putri & Mutiah, 2022).

At the national level, Indonesia's Total Fertility Rate (TFR) decreased from 2.6 in 2012 to 2.4 in 2017. The coverage of married women using family planning in Indonesia reached 63%, with 57% of them choosing modern methods such as pills and injections (Nurmainah et al., 2022). The 2017 Indonesian Demographic and Health Survey (IDHS) recorded that the Neonatal Mortality Rate (NMR) was 15 per 1,000 live births with a 2024 target of 10 per 1,000 live births, while the Infant Mortality Rate (IMR) was 24 per 1,000 live births with a 2024 target of 16 per 1,000 live births. One strategic approach to achieving these targets is through family planning programs (Pritasari, 2021).

The National Population and Family Planning Agency (BKKBN) launched the Family, Population, and Family Planning Development (Bangga Kencana) program as an effort to realize prosperous families in Indonesia. Data from the 2020 Indonesian Health Profile showed that the majority of acceptors used injectable contraceptives (72.9%), followed by pills (19.4%), and implants (8.5%) (Hidayati et al., 2022). Meanwhile, 2025 BKKBN data from Gampong Jawa Village, Langsa City showed that out of 1,192 couples of reproductive age (CRA), 722 acceptors (60.55%) used hormonal contraceptives with the breakdown of pills 340 (28.5%), injections 334 (28.02%), and implants 48 (4.03%) (BKKBN, 2025).

Hormonal contraceptives are known to affect body metabolism. The content of estrogen and progesterone can cause changes in fat metabolism, fluid retention, increased appetite, and insulin sensitivity disorders that lead to increased blood glucose levels (Bahar, 2022). This condition can increase the risk of prediabetes, which is a transitional phase between normal and diabetes. The International Diabetes Federation (IDF) reported that the prevalence of prediabetes in 2019 reached 373.9 million people (7.5%) of the adult population, projected to increase to 548.4 million people (8.6%) by 2045. Indonesia even ranks third highest in the world with 29.1 million people suffering from Impaired Glucose Tolerance (IGT) in 2019 (Decroli, 2020).

Research findings by Rahma et al. (2021) showed that there was no relationship between the use of pill or implant contraceptives and blood glucose levels, but injectable contraceptives were proven to be associated with

increased blood glucose levels. This indicates that different types of hormonal contraceptives have different effects on glucose metabolism.

Based on this description, the researcher is interested in investigating the relationship between hormonal contraceptive use and the incidence of prediabetes in Gampong Jawa Village, Langsa City in 2025.

METHODS

This study employed a descriptive-analytical design with a cross-sectional approach. The research was conducted in Gampong Jawa, Langsa Kota District, from February to April 2025. The study population comprised all hormonal contraceptive acceptors in the village, with a sample of 30 respondents selected using accidental sampling technique.

Data collection was conducted through interviews using questionnaires that included demographic data, types of hormonal contraceptives used, and duration of contraceptive use. Blood glucose levels were measured using a glucometer. The obtained data were analyzed descriptively and bivariately using the Chi-Square test to determine the relationship between variables. The analysis results were presented in the form of frequency distribution tables and narrative descriptions.

RESULTS

This research was conducted on February 19, 2025, with a total of 30 respondents and has been approved with Ethical Clearance number DP.04.03/12.7/029/2025. The results of this research can be seen in the table below.

Table 1. Frequency Distribution of Respondent Characteristics

No	Respondent Characteristics	f	%
1	**Age**		
	Middle adulthood: (23-33 years)	53.3	53.3
	Late adulthood: (34-43 years)	46.6	46.6
	Total	100	100
2	**Educational Background**		
	Elementary School	2	6.6
	High School	19	63.3
	Higher Education	9	26.6
	Total	30	100

No	Respondent Characteristics	f	%
3	**Occupation**		
	Housewife	29	96.6
	Self-employed	1	3.3
	Total	30	100
4	**Ethnicity**		
	Acehnese	14	46.6
	Padang	3	10
	Javanese	10	33.3
	Batak	3	10
	Total	30	100

Table 1 shows that the majority of respondents were aged 23-33 years, comprising 16 people with a percentage of 53.3%. The highest educational attainment was predominantly high school graduates, consisting of 19 people with a percentage of 63.3%. Occupation showed that the majority were housewives, comprising 29 people with a percentage of 96.6%. Ethnicity indicated that the majority were of Acehnese ethnicity, consisting of 14 people with a percentage of 46.6%.

Table 2. Frequency Distribution of Hormonal Contraceptive Types

No	Hormonal Contraceptive Types	f	%
1	**Injectable**		
	Progestin injection/3-month injection	12	40
	Combination injection/1-month injection	4	13.3
	Total	16	100
2	**Pill**		
	Combination pill	6	20
	Progestin pill/mini pill	5	16.7
	Total	11	100
3	**Implant**		
	2-rod implant	3	100
	Total	3	100

Table 2 shows that the most commonly used type of contraceptive by respondents was Progestin Injection (3 Months), with 12 respondents or 40% of the total 30 respondents, and the most frequently used contraceptive pill by respondents was the combination pill, comprising 6 respondents or 20%.

Table 3. Frequency Distribution of Duration of Hormonal Contraceptive Us

No	Duration of Use	f	%
1	≥ 2 years	22	73.3
	< 2 years	8	26.7
	Total	**30**	**100**
	Duration of Use	**f**	**%**

Table 3 shows that 73.3% of respondents have been using contraceptives for more than 2 years.

Table 4. Frequency Distribution Based on Blood Glucose Levels of Hormonal Contraceptive Users

No	Blood Glucose Level	f	%
1	Hypoglycemia < 70 mg/dl	0	0
	Normal 70 – 140 mg/dl	22	73.3
	Prediabetes 141 – 199 mg/dl	8	26.7
	Total	**30**	**100**

Table 4 shows that respondents' blood glucose levels can be divided into two categories: < 140 mg/dl with 22 (73.3%) acceptors and ≥ 140 mg/dl with 8 (26.7%) acceptors.

Table 5. Relationship Between Hormonal Contraceptive Types and Duration of Hormonal Contraceptive Use with Blood Glucose Levels

Variable	Blood Glucose Level		Total	P-Value
	Normal	Prediabetes		
	f	%	f	%
Pill contraceptive type				
Progestin pill/mini pill	4	13.3	1	3.3
Combination pill	6	20	0	0
Total	10	33.3	1	3.3

Variable	Blood Glucose Level		Total	P-Value
	Normal	Prediabetes		
	f	%	f	%
Injectable contraceptive type				
Progestin injection/3-month injection	5	16.6	7	23.3
Combination injection/1-month injection	4	13.3	0	0
Total	11	29.9	7	23.3
Duration of hormonal contraceptive use				
< 2 years	8	26.7	0	0
≥ 2 years	16	53.3	6	20
Total	24	80	6	20

Table 5 shows that the majority of women who used combination pills had normal blood glucose levels at 20%. The statistical result showed a P-value of 0.251 (> 0.05), therefore it can be concluded that pill contraceptive type has no relationship with blood glucose levels.

For the injectable contraceptive type variable, the majority used progestin injection/3-month injection with prediabetic blood glucose levels at 23.2%. The statistical result obtained a P-value of 0.042 (< 0.05), therefore it can be concluded that injectable contraceptive type has a relationship with blood glucose levels.

For the duration of hormonal contraceptive use variable, the majority of women had been using contraceptives for ≥ 2 years with normal blood glucose levels at 53.3%. The statistical result showed a P-value of 0.046 (< 0.05), therefore it can be concluded that the duration of hormonal contraceptive use has a relationship with blood glucose levels.

DISCUSSION

1. Relationship Between Pill Contraceptive Use and Blood Glucose Levels

   The research results showed no significant relationship between pill contraceptive use and blood glucose levels, with all respondents having blood glucose levels below the threshold (p-value = 0.251), indicating that pill contraceptives do not affect blood glucose levels.

   Pill contraceptives are tablet pills considered a reliable contraceptive method. All pills contain estrogen and progesterone, where estrogen typically inhibits ovulation and suppresses the development of fertilized eggs. It may also inhibit implantation, while progesterone in the pill neutralizes cervical mucus to prevent sperm entry. This hormone also prevents conception by slowing egg transport and inhibiting ovulation (Murniati, 2020).

   These findings align with research conducted by Bahar et al. in 2022, which concluded that birth control pill use does not have

significant negative impacts, so there is no need to worry about long-term use while maintaining a healthy lifestyle. This research is expected to serve as input, reference, or comparison for future health science research, particularly regarding blood glucose (Bahra & Anwar, 2022).

Based on the available data, the use of pill contraceptives (both combination pills and progestin pills) showed no direct relationship with blood glucose levels ≥ 140 mg/dl. All respondents using pill contraceptives had blood glucose levels < 140 mg/dl. This indicates that both types of pill contraceptives are not associated with increased blood glucose levels above the desired threshold (≥ 140 mg/dl).

Based on the research results, there was no significant relationship between progestin pill or combination pill use and blood glucose levels higher than 140 mg/dl. All respondents had blood glucose levels below this threshold.

2. Relationship Between Injectable Contraceptive Use and Blood Glucose Levels

The research results showed a significant relationship between injectable contraceptive use and blood glucose levels, with 7 respondents having blood glucose levels above the threshold (p-value = 0.042), indicating that injectable contraceptives affect blood glucose levels.

Injectable contraceptives are efforts to prevent pregnancy using hormonal injections. This type of hormonal contraception is increasingly used in Indonesia due to its effectiveness, practical use, relatively low cost, and safety. However, this hormonal contraception can mostly disrupt menstrual patterns due to the hormones contained in this contraceptive (Anggeriani et al., 2022).

These research findings align with research conducted by Widarti et al. in 2022, showing a significant relationship between injectable contraceptive use and blood glucose levels. The side effects of progestin injectable contraceptives/DMPA include increased insulin levels, especially in diabetic and obese women (Widari et al., 2022).

Overall, 12 respondents using injectable contraceptives were analyzed. The majority (7 people) using 3-month Progestin Injections had blood glucose levels ≥ 140 mg/dl. Meanwhile, for 1-month Combination Injections, all respondents had blood glucose levels < 140 mg/dl.

Based on the research results, progestin injectable contraceptive use showed a significant relationship with higher blood glucose levels (≥ 140 mg/dl), while combination injections did not show a similar relationship.

3. Relationship Between Implant Contraceptive Use and Blood Glucose Levels

The research results showed no significant relationship between implant contraceptive use and blood glucose levels, with all respondents having blood glucose levels below the threshold (p-value = cannot be tested), indicating that implant contraceptives do not affect blood glucose levels.

Implant contraceptives are contraceptive devices in the form of silastic capsules containing levonorgestrel hormone. The advantage of implant contraceptives is their high effectiveness in preventing pregnancy. The success rate is quite high, with only 1 out of 100 implant contraceptive users becoming pregnant. The disadvantage of implant contraceptive methods is triggering weight gain or loss when synthetic progesterone is released from the device implanted under the skin, or contraceptive devices for women installed (inserted) under the skin with the upper part consisting of 6 capsules approximately 3 cm in size, requiring skin incision that can cause scarring (Laelah & Aprilina, 2020).

Research conducted by Rahma et al. in 2019 found no significant relationship between implant contraceptive use and blood glucose levels. Implants are contraceptive devices implanted under the skin. These implants contain progesterone hormones that work by inhibiting the ovulation process in the ovaries. They work by thickening cervical mucus, disrupting endometrial formation processes making implantation difficult, reducing sperm transport, and suppressing ovulation (Rahma et al., 2021).

Based on the research results, implant contraceptive use showed no relationship with high blood glucose levels (≥ 140 mg/dL). All respondents using implants had blood glucose levels < 140 mg/dL. Therefore, this data does not show increased blood glucose levels due to implant contraceptive use in this respondent group. However, since only 3 respondents used implant contraceptives in this data, the sample size was very small, affecting the validity of conclusions that can be drawn. To obtain more representative results, research with larger samples is needed.

Since there were 0 respondents with blood glucose levels ≥ 140 mg/dL in the 2-Rod Implant category, chi-square testing could not be performed for this data. Chi-square tests require variation in data categories to test relationships between variables. In this case, there was no variation in the higher blood glucose category (>140 mg/dl) for implants, making p-value calculation impossible.

4. Relationship Between Duration of Hormonal Contraceptive Use and Blood Glucose Levels

The research results showed a significant relationship between duration of hormonal contraceptive use and blood glucose levels. There were 22 respondents who had been using hormonal contraceptives for >

2 years and 8 respondents for < 2 years. There were 8 respondents using hormonal contraceptives with blood glucose levels > 140 mg/dl and duration of use > 2 years. When chi-square testing was performed, the results showed (p-value = 0.046), indicating that duration of hormonal contraceptive use affects blood glucose levels.

The duration of DMPA injectable contraceptive use affects increased blood glucose levels in injectable contraceptive acceptors. This blood glucose increase is also influenced by significant weight gain in acceptors, especially after long-term use. Factors affecting weight gain in injectable contraceptive acceptors include: hormonal factors, psychological factors, genetic factors, environmental factors, dietary patterns, and reduced physical activity. Injectable contraceptive acceptors are expected to maintain dietary patterns and engage in physical activities appropriate to caloric intake to prevent fat accumulation in the blood, which will affect cholesterol levels and ultimately lead to increased blood glucose levels (Laelah & Aprilina, 2020).

Based on the research results, duration of hormonal contraceptive use showed a significant relationship with higher blood glucose levels (≥ 140 mg/dL) as demonstrated by chi-square testing results (p-value = 0.046).

CONCLUSION

Based on the research results regarding the relationship between hormonal contraceptive use and prediabetes in Gampong Jawa, Langsa City in 2025, it can be concluded that pill contraceptive use is not significantly associated with prediabetes (p-value = 0.251), while injectable contraceptives are proven to have a significant relationship with prediabetes (p-value = 0.042). Duration of hormonal contraceptive use ≥ 2 years is also significantly associated with the incidence of prediabetes (p-value = 0.046), whereas implant contraceptives could not be tested and therefore do not show a meaningful relationship. Thus, it can be confirmed that there is a relationship between the use of certain hormonal contraceptives, particularly injectable contraceptives and long-term use, with the incidence of prediabetes.

Based on the research findings, it is recommended that women of reproductive age, especially users of progestin injectable contraceptives and those who have used hormonal contraceptives for ≥ 2 years, regularly monitor their blood glucose levels to prevent the occurrence of prediabetes. Healthcare providers are expected to be more active in providing education and monitoring hormonal contraceptive acceptors regarding the risk of glucose metabolism disorders. Furthermore, the results of this study can serve as a reference for future research with the same variables or different variables, thereby strengthening scientific evidence regarding the relationship between hormonal contraceptives and glucose metabolism disorders.

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