

Differences in the Incidence of Anemia in Acceptors of 1-Month Injection and 3-Month Injection Contraceptives

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ABSTRACT

Background : Anemia is a condition in which there is a reduced number of red blood cells or a lower concentration of hemoglobin within them. Injectable contraception is the most widely utilized hormonal option. Research clearly indicates that heavy or prolonged menstruation serves as a major trigger for iron deficiency anemia in women of childbearing age. The 1-month and 3-month injectable contraceptives contain hormones that notably affect menstrual patterns. This research intends to analyze the differences in the incidence of anemia between users of the 1-month and 3-month injectable contraceptives. **Method :** This research employed an observational analytic design with a comparative approach. The number of sample is 62 injectable contraceptive users, selected through consecutive sampling techniques. Hemoglobin levels were carefully examined as the measurement instrument. Data analysis using two methods, namely Independent sample t-test and Chi-Square test. **Results :** The findings distinctly indicate that among users of the 1-month injectable contraceptive, the majority exhibited regular menstrual patterns (40.3%). In contrast, most users of the 3-month injectable method experienced secondary amenorrhea (43.5%). Additionally, a significant proportion of respondents were found to be non-anemic (64.5%). The independent samples t-test yielded a p-value of 0,025. Meanwhile, the chi-square test yielded a p-value of 0,598. **Conclusion :** There is a difference in hemoglobin levels between acceptors of 1-month and 3-month injectable contraceptives. There is no difference in the incidence of anemia between acceptors of 1-month and 3-month injectable contraceptives.

Introduction

Anemia is a health condition characterized by the body's inadequate of red blood cells to carry oxygen or a reduced level of hemoglobin in the bloodstream. It is recognized as a significant health issue in developing countries, particularly affecting children, pregnant and postpartum women, adolescent girls, and menstruating women. In Southeast Asia, the prevalence of anemia is concerning, with approximately 244 million women affected (World Health Organization, 2024). In Indonesia, around 24,3% of women childbearing age and who have been pregnant experience anemia, this means that anemia is still a public health challenge in the country (Attaqy et al., 2021).

This study examines the occurrence of anemia among individuals who use modern contraceptive methods. These methods can influence menstrual patterns, which in turn may affect the occurrence of anemia. According to the 2023 Indonesian Health Profile, the majority of contraceptive users opt for the injection method, which accounts for about 35.3% of all choices. This trend has been consistent over the years, as participants tend to prefer short-term



contraceptive methods over long-term ones. The ease of access to injection services, available at the village and sub-district levels, contributes to this preference.

The side effects of a contraceptive method are a factor that needs to be considered in choosing a contraceptive method. The 1-month injection and 3-month injection contraceptive methods contain hormones that can affect menstrual patterns. The use of one month injection contraceptives involves a combination of estrogen and progesterone hormones. According to (Nazirun, 2019), explained that menstrual pattern disorders in 1-month injection contraceptive acceptors did not have too many side effects, there was only a little bleeding at the beginning of use (the first 1 to 3 months) and it would go away on its own. Meanwhile, the three month injectable contraceptive method often experience a higher rate of amenorrhea (Kurniawati & A'yun, 2023).

Abnormal Uterine Bleeding (AUB) is a significant clinical concern that can lead to iron deficiency anemia (Donnez et al., 2022). Women utilizing gonadal steroids for contraception frequently experience unscheduled bleeding (AUB-I). Hormonal contraception is linked to alterations in menstrual patterns, potentially resulting in anemia. It is essential to consider the side effects of any contraceptive method when making a choice. Both the 1-month and 3-month injection contraceptive methods contain hormones that may influence menstrual patterns.

Research conducted by (Daulay & Purwati, 2020) revealed no significant correlation between acceptors 3-month Depo-Provera injectable contraception and hemoglobin levels in women, with a p-value of 0.26. Most respondents in the study had normal hemoglobin levels, as they did not experience bleeding or spotting. In another study by (Kusworo, 2023), the occurrence of anemia was compared between users of intrauterine device (IUD) contraception and those using 1-month birth control injections were analyzed. The t-test produced a p-value of 0.001, users of the 1-month injection contraception have higher hemoglobin levels than women who use IUDs.

Sidoarjo Regency has 30 Health Centers, ranking fourth in East Java with approximately 406,155 active contraceptive acceptors. The active usage rate of contraceptives stands at 71.3%, primarily driven by injection contraceptives, which account for 63.2% of acceptors. This preference is largely due to the relative ease of access to injection services and the presence of service networks extending down to the village and sub-district levels (East Java Health Profile, 2023). Notably, Prambon District, one of the sub-districts in Sidoarjo, exhibits a high prevalence of ALKI (Anemia, Lila <23.5, Chronic disease, IMS). Within the Prambon Health Center's jurisdiction, 80.3% or 2,664 active contraceptive acceptors are affected by ALKI (Sidoarjo Regency Health Profile, 2023)

Researchers are motivated to conduct this study to support the government's family planning program. Reducing the incidence of anemia is one of the six World Health Assembly Global Nutrition Targets. Moreover, anemia in women of reproductive aged is a specific target of the UN Sustainable Development Agenda 2030. Although most women primarily utilize contraception to avoid pregnancy, it is essential to take into account its potential effects, including the risk of anemia or the possibility of reducing its occurrence. In light of this context, the researchers aim to further explore the differences in anemia incidence between those using 1-month injection contraception and those opting for 3-month injections.

Methods



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This research is an observational analytical study designed as a comparative analysis. The focus of the study was to analyze and compare anemia variables among acceptors of 1-month and 3-month injectable contraceptives.

The research took place at an independent midwife practice in Sidoarjo from May to August 2024. The study comprised two groups: the 1-month injectable and the 3-month injectable contraceptive acceptors. A total of 62 respondents participated, with 31 individuals in each group.

The research process for comparing the groups involved several steps:

- a. Identifying the research sample, which included acceptors of both 1-month and 3-month injectable contraceptives who met predetermined inclusion and exclusion criteria.
- b. Collecting data on hemoglobin levels using Hbmeter. Hemoglobin levels were measured when respondents returned for repeat visits for injectable contraceptive administration at the independent midwife practice.
- c. Processing the collected data using Excel.
- d. Conducting a comparative data analysis, beginning with a normality test. Independent samples t-test was performed to compared the variance in hemoglobin levels between the two groups, and a Chi-square test was utilized to examine the differences in anemia incidence among the groups.

The sampling method employed was consecutive sampling. Inclusion criteria included : being a woman of childbearing age, having used 1-month injectable contraception for more than 3 months, having used 3-month injectable contraception for more than 6 months, and being in good health as assessed by vital signs. Exclusion criteria included the consumption of iron tablets. The instruments used in this study comprised medical records detailing the use of 1-month and 3-month injectable contraceptives and hemoglobin level examinations conducted using a Hb meter.

Data analysis revealed that the data used in this study were normally distributed based on the normality test conducted using the Shapiro-Wilk method. The significance value exceeded the α , suggesting that distribution of the data was normal.

Results

Table 1 Respondent Characteristics

Category	Contraceptive Methods				Total	
	1 Month Injection		3 Month Injection		N	%
	N	%	N	%		
Age						
20 - 35 years	17	27.4%	19	30.6%	36	58%
> 35 years	14	22.6%	12	19.4%	26	42%
Duration of Use						
≤ 1 years	8	12.9%	10	16.1%	18	29%
> 1 years	23	37.1%	21	33.9%	44	71%
Menstrual Pattern						
Normal (≥24 days and ≤38 days)	25	40.3%	2	3.2%	27	43.5%
Amenore	2	3.2%	27	43.5%	29	46.8%
Spotting	1	1.6%	2	3.2%	3	4.8%



< 24 days	1	1.6%	0	0%	1	1.6%
> 38 days	2	3.2%	0	0%	2	3.2%
Anemia Status						
Non-anemic	16	25.8%	24	38.7%	40	64.5%
Mild Anemia	7	11.3%	4	6.4%	11	17.7%
Moderate Anemia	8	12.9%	3	4.8%	11	17.7%

The research involved 62 respondents who accepted contraceptives, divided into two groups : 31 participants using 1-month injectable contraceptives and 31 using 3-month injectable contraceptives. Table 1 presents the frequency of respondent characteristics based on age, duration of use, menstrual patterns, and anemia status. In the two contraceptive groups, it was noted that most respondents were aged between 20 and 35 years (58%), with most having used contraceptives for more than one year (71%). Additionally, a notable portion of 1-month injectable contraceptive acceptors exhibited regular menstrual patterns (40.3%), while a significant number of 3-month injectable contraceptive acceptors experienced secondary amenorrhea (43.5%). Moreover, most respondents were classified as non-anemic (64.5%).

Table 2 Mean of Hemoglobin Levels

Variabel	Mean	Standard Deviation	Minimum	Maksimum	N (Total)
Hemoglobin levels of 1 month injection acceptors	12.023	1.2912	10.2	14.4	31
Hemoglobin levels of 3 month injection acceptors	12.871	1.5913	9.0	16.1	31

According to table 2, the average hemoglobin level of 31 samples of 3-month injectable contraceptive acceptors is 12.871 g/dl, which is higher than the average hemoglobin level of those accepting 1-month injectable contraceptives, recorded at 12.023 g/dl. This results in a difference of 0.848 g/dl. Both groups exhibit average hemoglobin levels that fall within the non-anemic category.

Prior to performing a bivariate test to compare the two variables, a normality test was conducted. This assessment utilized the Shapiro-Wilk method. For the 1-month injection variable, a significance value of 0.142 was obtained, which exceeds the α value of 0.05, indicating that the data follows a normal distribution. Similarly, for the 3-month injection variable, a significance value of 0.959 was recorded, also surpassing the α value of 0.05, confirming the normality of the data.

Table 3 Independent Sample T-test

Variabel	N	Mean	<i>p-value</i>
Hemoglobin levels of 1 month injection acceptors	31	12.023	0.025
Hemoglobin levels of 3 month injection acceptors	31	12.871	



The findings displayed in the table, reveal a difference with a p-value of 0.025. This suggests a significant variation in hemoglobin levels among individuals using 1-month and 3-month injection contraceptives.

Table 4 Chi-Square Test

Anemia Status	Contraceptive Method				<i>p-value</i>
	1 Month Injection		3 Month Injection		
	N	%	N	%	
Non-anemic	16	25.8%	24	38.8%	0.598
Anemia	15	24.2%	7	11.2%	
Total	31	50%	31	50%	

The analysis results, derived from the chi-square test as shown in the table, show a p-value of 0.598. This suggest that there is no statistically meaningful difference in the incidence of anemia in acceptors of 1-month and 3-month injection contraception.

Discussion

Age Characteristics

In terms of age characteristics, the majority of injectable contraceptive users are aged 20 to 35 years, comprising 36 respondents (58%) within this group. Meanwhile, 26 respondents (42%) are aged 35 years or older, placing them at a higher risk.

The reproductive age for women is defined as 15-49 years, with the peak fertility age occurring between 20-35 years. Most injectable contraceptive acceptors are 35 years old or younger. Women in this age range focus on managing pregnancy spacing effectively, ideally 2-4 years apart and often favor injectable contraception (Mahmudah & Daryanti, 2023).

Researchers indicate that age significantly influences the choice of contraceptive methods based on their intended use. Generally, individuals under 20 seek contraception primarily to delay pregnancy, those aged 20 to 35 aim to space pregnancies, and those over 35 consider it to terminate fertility. The 20 to 35 age range is critical for managing pregnancy spacing, which calls for highly effective and reversible contraceptive options such as IUDs, pills, injections, and implants. Injectable contraception is particularly appealing due to its practicality, safety, simplicity, affordability, and effectiveness when administered consistently according to schedule.

Characteristics of Duration of Use

Regarding the characteristics of the duration of use, the study revealed that a majority of respondents, 44 respondents (71%) had utilized injectable contraception for more than one year, while 18 respondents (29%) reported using it for one year or less.

This finding is consistent with research conducted by (Natalia, 2019), which indicated that out of 49 women using 3-month injectable contraceptives, the majority 27 women had been using this method for an extended period. Similarly, among 19 users of 1-month injections, 10 women had also been using injectable contraception for a long period of time. The duration of use refers to the period during which women of childbearing age utilize injectable contraception. According to (Sinaga, 2021), using a 3-month injectable contraception can lead to menstrual disorders. Initially, users may experience irregular spotting, heavy bleeding, or bleeding outside of their menstrual cycle. If the use continues for more than one year, amenorrhea may occur.



The researcher noted that most respondents preferred using injectable contraceptives for more than one year due to their comfort and minimal disruption from side effects. Injectable contraception is effective for preventing or spacing pregnancies, allows for quick fertility return, and does not interfere with intimate relations between partners. However, some users may experience changes in their menstrual patterns, including irregular bleeding, reduced blood flow, prolonged bleeding, or amenorrhea. These changes can evolve over time with continued use of the contraceptive method.

Menstrual Pattern Characteristics

The study on menstrual pattern characteristics revealed that a majority of individuals using 1-month injectable contraceptives had regular menstrual cycles, with 25 respondents (40.3%) reporting this pattern. In contrast, among those using 3-month injectable contraceptives, the majority experienced amenorrhea, with 27 respondents (43.5%) reporting this condition.

Additionally, research by (Enggoe et al., 2022) examined the correlation between contraceptive method and menstrual disorders. The findings indicated that most of the respondents using 1-month injectable contraceptives did not experience menstrual disorders, totaling 115 respondents (48.7%). However, among those using DMPA injectable contraceptives, 88 respondents (37.3%) reported experiencing menstrual disorders. Hormonal contraceptives, particularly those containing progestin, can alter menstrual cycles. Menstrual irregularities are more common among users of 3-month injectable contraceptives compared to those using 1-month injectable contraceptives.

Based on the description, the use of injectable contraceptives can have side effects on menstrual patterns due to their hormonal content. These menstrual irregularities can manifest as amenorrhea, spotting, and changes in the frequency, duration, and volume of menstrual flow. Users of the 3-month injection often experience amenorrhea because these injections solely contain the hormone progesterone.

Characteristics of Anemia Status

The assessment of anemia status revealed that the majority of individuals receiving 1-month and 3-month injection contraceptives had normal hemoglobin levels, indicating they were not anemic. In total, 40 respondents (64.5%) fell into this category. The incidence of anemia was notably higher among those using 1-month injection contraceptives, where there were 7 respondents (11.3%) with mild anemia and 8 respondents (12.9%) with moderate anemia. In contrast, among users of 3-month injection contraceptives, 4 respondents (6.4%) displayed mild anemia, while 3 respondents (4.8%) experienced moderate anemia.

The correlation between anemia status and the use of hormonal contraception is further explained by (Britton et al., 2020), who noted that irregular menstrual periods are a common side effect of hormonal contraceptives. After one year of consistent use, only 12% of users of 3-month injections reported experiencing regular menstrual cycles, while 46% experienced amenorrhea. Although the side effects of hormonal contraception can vary from one individual to another, amenorrhea may be beneficial for clients dealing with anemia, endometriosis, fibroids, dysmenorrhea, or menorrhagia.

According to researchers, women of childbearing age are particularly vulnerable to anemia due to menstrual blood loss each month, which increases their need for iron. Variations in menstrual patterns can significantly impact anemia status.

Differences in Hemoglobin Levels



The findings from the analysis performed with an independent samples t-test show a meaningful difference, reflected in a p-value of 0.025. This suggest that there is a notable difference in hemoglobin levels between individuals using 1-month and 3-month injection contraceptives.

According to (Jacobstein & Polis, 2014), women using 3-month injection contraceptives often experience little to no menstruation. During the first year of use, approximately 10-30% of women may develop amenorrhea after just one injection, and by the fourth injection, this figure rises to 40-50%. Over five years of use, around 80% of women will experience amenorrhea. While some may experience irregular bleeding, users of 3-month injections typically see an increase in hemoglobin levels, which can help protect against anemia. The reduction in menstrual bleeding is linked to a decreased incidence of anemia. Additionally, the use of 3-month injection contraceptives may help in preventing symptomatic Pelvic Inflammatory Disease (PID) and iron deficiency anemia (BKKBN, 2023).

This aligns with findings from (Idharuddin., 2023), which indicate that the occurrence of amenorrhea is more prevalent among users of 3-month injectables compared to those taking 1-month injectables. Contraceptive methods that solely utilize progestin hormones (such as the 3-month injections) tend to cause more menstrual irregularities compared to combination contraceptive methods (like the 1-month injections). Common side effects associated with injection contraceptives include disturbances in menstrual pattern, such as amenorrhea, spotting, as well as changes in the duration and volume of menstrual bleeding. These alterations in menstrual patterns have the potential to influence users satisfaction with the method, their likelihood of continuing its use, and overall women's well-being.

Reduced menstrual bleeding due to contraceptive use is the underlying mechanism of the correlation of hormonal contraceptive use and iron deficiency anemia (Haile et al., 2017). Women typically experience monthly menstrual cycles during which they can lose approximately 100 to 150 mg of iron. If this loss is not compensated for with adequate nutrition and supplementation, it may lead to iron deficiency, either directly or indirectly. Furthermore, hormonal contraceptives provide advantages beyond preventing pregnancy, including assistance in controlling menorrhagia, a recognized risk factor for anemia.

Heavy Menstrual Bleeding (HMB) affects around 30% of women of childbearing age who are menstruating, significantly increasing their risk of iron deficiency anemia. The blood loss associated with mestruastion can notably aggravate anemia in this population. Thankfully, there is a wide range of effective contraceptive methods available that can manage HMB or even induce amenorrhea, effectively reducing the complications linked to anemia (Baldwin et al., 2023). A study conducted across multiple countries (Misunas et al., 2024) demonstrated a significant and consistent correlation of hormonal contraceptive use and lowered incidence of anemia in adolescents and women. This correlation remained significant even after adjusting for various factors, including age, household wealth, and BMI, underscoring the importance of hormonal contraception in addressing this critical health issue.

The variation in hemoglobin levels between users of 1-month and 3-month injectable contraceptives can be attributed to the differing side effects associated with hormonal contraceptive use. These two types of injectables contain different hormonal compositions and are linked to distinct menstrual patterns. The 3-month injectable contraceptives, which consist solely of progestin, tend to cause more menstrual irregularities compared to the combination contraceptive methods found in 1-month injectables. Although 3-month injectables may lead to amenorrhea (the absence of menstruation), they are considered safe and have the potential to increase hemoglobin levels.



Differences in the Incidence of Anemia

Based on the study's results, a significant portion of respondents using 1-month and 3-month injectable contraceptives were in good health and not suffering from anemia, representing 64.5% of those surveyed. A Chi-square analysis was performed to assess anemia status, yielding a p-value of 0.598. This suggests that there is no substantial difference in the incidence of anemia among those using 1-month versus 3-month injectable contraceptives.

It is important to note that factors contributing to anemia extend beyond menstrual bleeding. A poor diet can lead to iron deficiency anemia, and in Indonesia, it is widely believed that a significant proportion of anemia cases arise from insufficient intake of iron-rich foods, particularly those derived from animal sources (World Health Organization, 2024). Additionally, socio-economic conditions play a crucial role, as they relate closely to hygiene and sanitation. The existence of infectious diseases like HIV, malaria, and gastrointestinal issues also heightens the likelihood of developing anemia.

Researchers note that contraceptive methods have varying effects on different women. For certain individuals, using injectable contraceptives could result in a reduction in the occurrence of anemia, whereas for others, this might not be true. Thus, the factors causing anemia are not limited to contraceptive usage; nutrition, socioeconomic status, and infections also contribute.

Method safety, efficacy, and fertility return are important factors, but they are not the only ones that influence an individual's choice. Health care providers need to understand that each individual is aware of the different side effects of various contraceptives. Factors such as ease of use, comfort levels, acceptance by a partner, as well as medical factors including possible side effects, play a critical role in making choices about contraception. By understanding this comprehensive context, health care providers can better assist clients in selecting the method that aligns most closely with their preferences and needs.

Conclusion

The following conclusions can be drawn.

1. Most acceptors of injectable contraceptives are aged 20-35 years and most have used contraception for > 1 year.
2. Menstrual patterns in acceptors of 1-month injectable contraceptives show that the majority experience normal (regular) menstruation. In acceptors of 3-month injectable contraceptives, the majority experience amenorrhea. Most respondents have normal hemoglobin levels (not anemic).
3. There is a difference in hemoglobin levels in acceptors of 1-month and 3-month injection contraceptives.
4. There is no difference in the incidence of anemia in acceptors of 1-month and 3-month injection contraceptives.

Ethics approval and consent to participate

This study has undergone and received approval from an ethical review board by the Health Research Ethics Committee, Faculty of Medicine, Universitas Airlangga, with no. 96/EC/KEPK/FKUA/2024.

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