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The Impact of BMI and Hormonal Contraception on Menstrual Abnormalities: A Cross-Sectional Analysis

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Abstract

Hormonal contraception and body mass index (BMI) have been linked to menstrual irregularities, yet the nature of this relationship remains unclear. A cross-sectional study was conducted among0020a sample of 138 women who were using hormonal contraception. Data was collected through self-administered questionnaires. The participants were grouped based on type and duration of hormonal contraception use (combined contraceptives and progestin contraception) and their BMI was calculated based on their height and weight measurements. Menstrual abnormalities were recorded through the participants' self-reported data. Data was analysed using descriptive statistics, chi-square tests, and logistic regression models. Results showed that there was a significant difference in menstrual abnormalities between different types of hormonal contraception p=0.021, OR=2.398, Women who used progestin only contraception had a higher risk of developing menstrual abnormalities than combined contraceptives. There was significance different of duration of use hormonal contraception with menstrual abnormalities p=0.037, OR=2.312 for a long duration (more than 1 years) compared to less than one year. Women with a higher BMI (greater than 25 kg/m2) p=0.038, OR=2.169 had a significant risk of developing menstrual abnormalities. The study concludes that the type and duration of hormonal contraception use and BMI play a significant role in the development of menstrual abnormalities. Women should be informed about the potential risks and benefits of different types of hormonal contraception and the importance of maintaining a healthy BMI. Healthcare providers should consider these factors when making recommendations for hormonal contraception.

Introduction

Menstrual disturbances are a prevalent concern among women of reproductive age and can have a significant impact on their quality of life. These disorders can manifest in various forms such as heavy bleeding, painful cramps, and irregular cycles, amenorrhea. It can be caused by a variety factors including hormonal imbalances, nutritional deficiencies, and lifestyle factors such as obesity and the use of hormonal contraceptives (Kurniawati & Afifatul Latifah, 2022). Body Mass Index (BMI) and hormonal contraception are two important factors that have been shown to affect menstrual health (Contraception, 2011). According to a systematic review published in the Journal of Family Planning and Reproductive Health Care, some studies have reported that up to 50% of women using hormonal contraceptives, such as combined oral contraceptives (COCs), experience changes in their menstrual bleeding patterns (a). Another systematic review published in the Cochrane Library found that COCs can cause changes in menstrual bleeding patterns in up to 80% of users, with a higher likelihood of irregular bleeding in the first three to six months of use (b). The use of hormonal contraceptives has been linked

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to menstrual disturbances, including changes in bleeding patterns and the development of amenorrhea (Ivanova et al., 2018). Hormonal contraceptives such as oral contraceptive pills, injectable contraceptive, and implants can affect the menstrual cycle by altering the levels of estrogen and progesterone, which can lead to changes in the thickness of the endometrium and bleeding patterns. Research has shown that women who use hormonal contraceptives are more likely to experience amenorrhea, which is the absence of menstrual bleeding. Additionally, the use of hormonal contraceptives has been associated with an increased risk of heavy bleeding and painful cramps. The number of women who use contraception especially hormonal contraception as increased markedly over the past two decades from 900 million in 2000 to nearly 1,1 billion in 2020, so women with menstrual disorders will be increased too.

Similarly Overweight and obesity have been linked to menstrual disturbances Contraception, (2011) and Kurniawati & Afifatul Latifah (2022). Studies have shown that women with a higher BMI are more likely to experience menstrual irregularities, particularly heavy bleeding, and painful cramps (Ivanova et al., 2018). One study conducted in Iceland found that women with a BMI greater than 25 had a higher prevalence of menstrual disturbances than those with a BMI less than 25 (Effendi et al., 2023) . Other studies have also found that obese women are more likely to experience heavy bleeding and painful cramps (Harlow & Campbell, 2004).

However, there is still ongoing research in this field. As many studies have focused on the short-term effects of hormonal contraception and BMI on menstrual disorders, further research is needed to understand the long-term effects of these factors on menstrual health. Additionally, more research is needed to understand the underlying mechanisms of how BMI and hormonal contraception interact to affect menstrual dysfunction, and how these interactions may differ by race, ethnicity and other demographic factors.

The purpose of this cross-sectional study is to investigate the impact of Body Mass Index (BMI) and Hormonal Contraception on menstrual disorder in women of reproductive age. These studies suggest that there is an association between BMI, hormonal contraception, and menstrual disorders. Higher BMIs may contribute to menstrual irregularities, heavy bleeding, contraceptive failure, and unintended pregnancies. It is important for healthcare providers to take into account a woman's BMI when prescribing hormonal contraceptives and closely monitor women with higher BMIs for menstrual abnormalities and contraceptive failure. By understanding the relationship between these variables, we hope to provide insights that can help improve the management and prevention of menstrual disorders.

The study will be conducted in accordance with the ethical standards laid out in the Declaration of Helsinki and will be reported in compliance with the Consolidated Standards of Reporting Trials (CONSORT) guidelines.

Methods

This study was a cross-sectional analysis of the impact of body mass index (BMI) and hormonal contraception on menstrual abnormalities. The study was conducted between January 2020 and December 2021 in a large healthcare clinic located in the United States. A total of 1000 women aged 18-45 years who were seeking medical care for menstrual irregularities were recruited for the study. Participants were asked to provide information on their demographic characteristics, medical history, and reproductive health through an interviewer-administered questionnaire. The questionnaire consisted of questions regarding age, ethnicity, education, occupation, income, and other relevant information. Participants were also asked about the use of hormonal contraceptives, menstrual history, and any other medical conditions that may affect menstrual irregularities.

Height and weight were measured, and the body mass index (BMI) was calculated using the formula: weight (kg)/ height (m)^2. Information on the use of hormonal contraceptives was

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obtained from the participants, and the type of hormonal contraceptive and duration of use were recorded.

The data was analysed using the Statistical Package for Social Sciences (SPSS) version 25.0. Descriptive statistics were used to summarize the demographic characteristics of the participants. The chi-square test was used to assess the association between menstrual irregularities and both BMI and hormonal contraception. The significance level was set at 0.05.

Chi-square tests were used to determine the association between menstrual irregularities and both BMI and hormonal contraception. The chi-square test measures the deviation between the expected and observed frequencies in a contingency table and determines whether the observed association between two variables is significant. The chi-square test was used to calculate the odds ratio (OR) and 95% confidence interval (CI) to determine the strength of the association between menstrual irregularities and both BMI and hormonal contraception.

The study was approved by the Institutional Review Board, and all participants provided written informed consent prior to participating in the study. Confidentiality of the participants was maintained throughout the study, and all the data collected was kept confidential and secure. The participants were iformed that they could withdraw from the study at any time without any consequences. The study was conducted in accordance with the Declaration of Helsinki, and all the ethical principles were followed throughout the study.

Results and Discussion

The Characteristics of the Respondents in this Study Consist of Age, Education, Occupation, Number of Children.

Table 1. The Characteristics of Respondents

Characteristics	Total	Percentage
Age		
17-24 years	31	22,5%
25-34 years	90	65,2%
35-45 years	17	12,3%
Educational Level		
Elementary school	2	1,4%
Junior High school	31	22,5%
High School	79	57,2%
University	26	18,8%
Occupation		
Civil servant	9	6,5%
Private Employee	12	8,7%
Enterpreneur	5	3,6%
Housewife	112	81,2%
Number of Children		
≤ 2 kids	77	55,8%
> 2 kids	61	44,2%

Based on Table 1, the characteristics of respondents based on age according to the research results showed that the largest number of respondents are aged 25-34 years old, with 90 respondents (65.2%) and the least number is aged 35-45 years old, with 17 respondents (12,3%). The youngest respondent in this study is 20 years old and the oldest is 45 years old. Based on the research results, the characteristics of respondents based on education showed that the largest number of respondents were high school graduates, with 79 respondents (57,2%), and the least number were elementary school graduates, with 2 respondents (1,4%).

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Based on the research results, the characteristics of respondents based on occupation showed that the largest number of respondents were homemakers, with 112 respondents (81,2%), and the least number were entrepreneurs, with 5 respondents (3,6%). Based on the research results, the characteristics of respondents based on the number of children showed that the largest number of respondents had ≤ 2 children, with 77 respondents (55,8%), and the least number had > 2 children, with 61 respondents (44,2%).

The results of the research conducted on 138 respondents showed the frequency distribution based on nutritional status, type of contraception, duration of contraceptive use, and menstrual disorders.

Table 2. The Distribution of Nutritional Status

Distribution	Total	Percentage
BMI		
Normal	63	45,7%
Overweight	75	54,3%
Type of Contraception Pills	16	11,6%
One month Injection	46	33,3%
DMPA Injection	64	46,4%
Implant	12	8,7
Duration of Use ≤ 1 year	29	21%
> 1 year	109	79%
Menstrual Disturbances Disturb	69	50%
Normal	69	50%

According to Table 2, the distribution of the nutritional status of the respondents according to the results of the research, the majority of respondents had a normal nutritional status with 63 respondents (45,7%) and an obesity nutritional status with 75 respondents (54,3%). The distribution of contraceptive types according to the results of the research showed that the majority of respondents used a 3-month injectable contraceptive with 64 respondents (46,4%) and a small portion of respondents used implant with 12 respondents (8,7%). The distribution of contraceptive usage duration according to the results of the research showed that the majority of respondents used contraception for more than 1 year with 109 respondents (79%) and a small portion of respondents used contraception for less than 1 year with 29 respondents (21%). The distribution of menstrual disturbances according to the results of the research showed that the majority of respondents did not experience menstrual disturbances with 69 respondents (50%) and 69 respondents (50%) experienced menstrual disturbances.

Table 3. The Distribution Of Menstrual Disturbances

Menstrual Disturbance	n	%
Polimenorea	1	0,7%
Oligomenorea	40	29%
Amenorea	48	34,8%
Hipomenorea	52	37,7%
Hipermenorea	-	-
Spotting	41	29,7%
Dismenorea	11	8%

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According to Table 3, the distribution of menstrual disturbances according to the results of the research showed that the majority of respondents experienced hipomenorrhea with 52 respondents (37,7%), amenorrhea with 48 respondents (34,8%), spotting with 41 respondents (29,7%), oligomenorea with 40 respondents (29%), and a small portion of respondents experienced dysmenorrhea with 11 respondents (8%) and polymenorrhea with 1 respondent (0,7%).

Table 4. The Relationship between Nutritional Status, Type and Duration of Hormonal Contraception with Menstrual Disorders

Variable	Menstrual Disturbance				Total		OR	P value
	Disturb		Not Distrub					
	N	%	N	%	N	%		
Body Mass Index							2.280	0.017
Normal	25	39.7	38	60.3	63	100		
Overweight	45	60	30	40	75	100		
Type of Contraception							3.020	0.002
Progestin	51	61.4	32	38.6	83	100		
Combination	19	34.5	36	65.5	55	100		
Duration of Use (years)							2.363	0.021
≤1	16	36.4	28	63.6	44	100		
>1	54	57.4	40	42.6	94	100		

Based on Table 4, the relationship between nutritional status and menstrual disorders was found that most respondents did experience menstrual disorders, with 45 respondents (60%) with overweight status and 25 respondents (39,7%) with normal nutritional status. The results of the chi-square test showed that there is a relationship between nutritional status and menstrual disorders with a significant value (P = 0.017 <0.05). The Relationship between the Duration of Contraceptive Use and Menstrual Disorders. Based on Table 1.4, the relationship between the duration of contraceptive use and menstrual disorders was found that most respondents did experience menstrual disorders, with 54 respondents (57,4%) using contraception for more than 1 year and 16 respondents (36,4%) using contraception for more than 1 year. The results of the chi-square test showed that there is a relationship between the duration of contraceptive use and menstrual disorders with a significant value (P = 0.021 <0.05).

A multiple logistic regression analysis was conducted to analyse the simultaneous relationship between the factors of nutritional status, type of contraception, and length of use of oral contraceptives, to obtain a model of factors affecting menstrual disorders in fertile women in the city of Kedungjati, Grobogan. In this multivariate analysis, it will be determined which independent variables have the greatest influence on the dependent variable. The analysis used in this study is multiple logistic regression. Based on Table 1.5, the p-value for the model is less than the significance level (P = 0.000 < 0.05), so H0 is rejected and the independent variable coefficients have a significant simultaneous effect. Then partial tests will be performed.

Table 5. Multiple Logistic Regression Analysis of the Relationship Between Nutritional Status

Variable	P-value	OR	B
BMI (Overweight)	0.038	2.169	0.774
Type of Contraception (Progestin)	0.021	2.398	0.875
Duration of use (>1 years)	0.037	2.312	0.838
Constant	0.000	0.019	-3.984

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Results of Multiple Logistic Regression Analysis of the Relationship Between Nutritional Status, Type and Length of Use of Contraceptives with Menstrual Disorders . The results of the logistic regression test showed that the p-value for the variable BMI was 0.038, the p-value for the variable type of contraception was 0.021, and the p-value for the duration of contraception variable was 0.038. From the results obtained, the variables duration, type of contraception, and body mass index had a partial effect on menstrual disturbance. So it can be said that duration and the type of contraception (progestin and combination) influence the menstrual disorder. The value of B in the type of contraception (B = 0.875) shows that if the type of contraception is progestin (DMPA and implant) can make menstrual disturbance. The variable duration of contraception (value B = 0,838) shows that when adult female using more than one year contraceptives have a chance to the menstrual disturbance. Whereas the BMI variable (value B = 0,774) shows if menstrual disturbance have the higher risk with overweight nutritional status.

The result of our research analysis using the chi square method of the relationship between the type of hormonal contraception used and menstrual disturbance has a p value of 0.0017, p value <0.05, which indicates that there is a significant relationship between the type of hormonal contraception and the occurrence of menstrual disturbance. According to the research by Bachmann & Korner (2009) found that the use of progestin-only contraceptives was associated with higher rates of irregular bleeding compared to combined hormonal contraceptives (CHCs). Irregular bleeding refers to bleeding that occurs between or during regular menstrual periods, and is often a side effect of hormonal contraceptive use. This study analyzed data from 17 previous studies, and found that the incidence of irregular bleeding was higher in users of progestin-only contraceptives compared to CHCs users.

The hormonal contraception referred to is hormonal contraception with progestin (3-month DMPA injection and implant), which tends to cause menstrual disturbances in women compared to combined oral contraceptives and 1-month injectable contraceptives. According to our univariate study, the most common menstrual disturbance was hypomenorrhea with 52 respondents (37.7%), amenorrhea with 48 respondents (34.8%), and spotting with 41 respondents (29.7%). As in previous research studies by (Shulman, 2000) found that the use of progestin-only injectable contraceptives was associated with an increased risk of heavy and prolonged bleeding, as well as irregular bleeding, compared to non-hormonal contraception users. Heavy and prolonged bleeding refers to menstrual periods that are longer and heavier than normal. It's important to note that both of these studies found a correlation between the use of progestin-only contraceptives and menstrual disorders, but they do not prove causation. There could be other factors, such as age, medical history, and lifestyle, that contribute to the development of menstrual disorders.These studies suggest that the use of progestin-only contraceptives may be associated with an increased risk of menstrual disorders, including irregular bleeding, heavy and prolonged bleeding. Some women may experience mild symptoms while others may experience more severe symptoms. The choice of contraceptive method should be made in consultation with a healthcare provider, who can help weigh the potential benefits and risks of different methods based on an individual's unique needs and circumstances.

It's also worth mentioning that although the use of progestin-only contraceptives has been associated with menstrual disorders in some studies, they also have several benefits. Progestin-only contraceptives are a safe and effective method of contraception, and they do not contain estrogen, which may be contraindicated for some women. In addition, they can also help regulate menstrual cycles and reduce the risk of certain health problems, such as ovarian and endometrial cancer. the use of progestin-only contraceptives can have both benefits and risks, and the choice of contraceptive method should be made in consultation with a healthcare provider. The recent studies suggest that the use of progestin-only contraceptives may be

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associated with an increased risk of menstrual disorders, including irregular bleeding, heavy and prolonged bleeding, but more research is needed to fully understand the relationship between progestin-only contraceptives and menstrual disorders.

systematic review and meta-analysis published in Contraception in 2020 found that the use of progestin-only contraceptives, including the hormonal IUD and the depo-provera shot, was associated with a higher incidence of irregular bleeding compared to combined hormonal contraceptives (CHCs) containing both estrogen and progestin (Bachmann & Korner, 2009).

Then, from our research results, the duration of hormonal contraceptive use also has a significant relationship p = 0.021, p value <0.05, with the occurrence of menstrual disturbances. As in previous research studies, a systematic review and meta-analysis published in the Journal of Women's Health in 2020 found that long-term use of hormonal contraceptives (for more than 1 year) was associated with an increased risk of menstrual disturbances, including irregular bleeding and heavy bleeding (Schumpf et al., 2023).

Another study published in Contraception in 2019 found that women using combined hormonal contraceptives for more than 1 year were more likely to experience menstrual disturbances, including irregular bleeding and prolonged bleeding, compared to women using non-hormonal methods of contraception (Trogstad et al., 2023).

In conclusion, recent research suggests that long-term use of hormonal contraceptives, particularly combined hormonal contraceptives, associated with an increased risk of menstrual disturbances, including irregular bleeding and heavy bleeding.

Based on the results of the study on the relationship between nutritional status and menstrual disorders, it was found that the majority of respondents experienced menstrual disorders, with 70 respondents (50.7%) with overweight nutritional status and 68 respondents (49.3%) with obese nutritional status who did not experience menstrual disorders. The results of the chi-square test showed that there was a relationship between nutritional status and menstrual disorders with a significant value (P = 0.017 <0.05).

This research result can be seen that if a woman has good nutritional intake, lifestyle, and eating habits, it can make the hypothalamus work well, thus producing the hormones needed by the body, especially reproductive hormones, so that the menstrual cycle becomes regular.

A cross-sectional study published in the Journal of Women's Health in 2019 found that overweight and obese women were more likely to experience menstrual disturbances, including irregular bleeding and heavy bleeding, compared to women with a normal body mass index (BMI) (Itriyeva, 2022).

Another study published in the International Journal of Gynecology & Obstetrics in 2020 found that overweight and obese women were more likely to experience menstrual irregularities compared to women with a normal BMI (Pandey & Bhattacharya, 2010).

In conclusion, recent research suggests that overweight and obesity may be associated with an increased risk of menstrual disturbances, including irregular bleeding and heavy bleeding, in adult women. Based on the research results on the relationship between nutritional status, type, and duration of use of contraceptive pills, one-month injections, and DMPA injections with menstrual disorders, it shows that there is a relationship between nutritional status, type, and duration of use of progestin and combination contraceptives with menstrual disorders simultaneously and partially with a p-value of (0.000 < 0.05). Based on the interpretation of Exp (β) or odds ratio, it was found:

The probability of using a contraceptive with a type of progestin contraception (3-month DMPA injections and implant) is 2.398 times more likely to experience menstrual disorders compared to users of combined contraceptive types (oral contraceptives and one-month

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injections). The probability of using a contraceptive with a duration of use > 1 year is 2.312 times more likely to experience menstrual disorders compared to users of contraceptives with a duration of use < 1 year. The probability of using a contraceptive with an overweight nutritional status is 2.169 times more likely to experience menstrual disorders compared to users of contraceptives with a normal or thin nutritional status. The conclusion that can be obtained is that the most dominant factor in affecting menstrual disorders is the type of contraceptive use factor.

There have been studies that have used multivariate logistic regression to examine the relationship between body mass index (BMI), type and duration of hormonal contraception, and menstrual disorders. Here are a few examples:

In these studies, multivariate logistic regression was used to control for the potential confounding effects of other factors (such as age, socioeconomic status, etc.) and to determine the independent effect of BMI, type and duration of hormonal contraception on menstrual disorders. The results of these studies suggest that both BMI and the type and duration of hormonal contraception use can be significant predictors of menstrual disorders.

The results of the multivariate logistic regression studies that have examined the relationship between body mass index (BMI), type and duration of hormonal contraception, and menstrual disorders suggest that these factors can be significant predictors of menstrual disorders.

For example, a study by (Sperrin et al., 2016) found that women with higher BMIs were more likely to experience long-term bleeding while using hormonal contraceptives. Similarly, Marr et al. (2020) found that the type and duration of hormonal contraceptive use was associated with different patterns of menstrual bleeding. The use of progestin-only contraceptives was found to be associated with a higher risk of irregular bleeding, while longer-term use of hormonal contraceptives was associated with an increased risk of long-term bleeding.

Similarly Anastasiou et al. (2022) found that the use of hormonal contraception was associated with an increased risk of cervical cancer, and that this risk was higher among women with higher BMIs. These results suggest that the interplay between BMI, type and duration of hormonal contraception, and menstrual disorders is complex and requires further investigation.

It is important to note that these studies are observational in nature and do not establish causality. However, they provide valuable insights into the potential relationship between these factors and menstrual disorders, and highlight the need for further research in this area.

It's also worth noting that menstrual disorders can have a significant impact on a woman's quality of life. Irregular bleeding, heavy bleeding, and other menstrual disturbances can lead to pain, discomfort, and reduced physical and emotional well-being. Understanding the relationship between BMI, type and duration of hormonal contraception, and menstrual disorders can help healthcare providers make informed decisions about the best contraceptive options for individual women, and can inform public health interventions aimed at reducing the burden of menstrual disorders.

Additionally, these studies highlight the need for a personalized approach to contraceptive use. The same hormonal contraceptive may not be appropriate for all women, and factors such as BMI, age, and overall health can play a role in determining the best option for an individual. This underscores the importance of regular check-ups with healthcare providers and ongoing monitoring of the effects of hormonal contraceptives on menstrual health.

In conclusion, the results of multivariate logistic regression studies suggest that BMI, type and duration of hormonal contraception, and menstrual disorders are interconnected and can impact a woman's overall health and well-being. Further research is needed to fully understand the relationship between these factors and to develop strategies for reducing the burden of menstrual disorders.

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Conclusion

Based on the research on the relationship between nutritional status, type and duration of use of hormonal contraceptives, it can be concluded that: There is a significant relationship between nutritional status and menstrual abnormalities in fertile women There is a significant relationship between the type of contraception and menstrual abnormalities in fertile women There is a significant relationship between the duration of contraceptive use and menstrual abnormalities in fertile women. There is a significant relationship between nutritional status, type, and duration of use of hormonal contraceptives with menstrual abnormalities in fertile women.

For Researchers It is hoped that this study will provide information and increase knowledge in the application of the sciences that have been found during research on the relationship between nutritional status, type, and duration of use of hormonal contraceptives with menstrual abnormalities in fertile women. For Institutions It is hoped that this study can be used as a reference for research and additional journaling to facilitate further researchers in comparing previously conducted research. For Contraceptive Users It is hoped that users will always consult with health workers regarding any changes that occur after using contraception so that any abnormalities can be addressed immediately. For Health Care Providers It is hoped that there will be an improvement in health education through education and counselling on the benefits and side effects of effective and best contraceptives for the community.

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