

Type and Duration of Use of Hormonal Contraceptives as a Trigger for Maternal Weight Increase in Family Planning Acceptors in Bali: A Cohort Study

Jenis dan Lama Penggunaan Kontrasepsi Hormonal Sebagai Pemicu Peningkatan Berat Badan Ibu pada Akseptor Keluarga Berencana di Bali: Studi Kohort

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Abstract

Introduction: Hormonal contraceptives are widely chosen by mothers to regulate the number of children and the spacing of births. However, the use of hormonal contraceptives provokes the side effects of weight gain. **Purpose:** This study evaluated the relationship between the type and duration of hormonal contraceptive use with weight gain in family planning acceptance in the Community Public Health Ubud I sub-district of Bali Province, Indonesia. **Methods:** The cohort study is a retrospective research design—a total of 92 acceptors, namely mothers who use contraception for at least six months as samples. Data are secondary sourced from medical records at Community Health Centers that meet the research criteria. Questionnaire as a measuring tool to obtain data on the type and duration of contraceptive use and body weight before and after hormonal contraceptive use. Analysis of bivariate data using the chi-square test and Wilcoxon test. **Results:** The number of 92 study subjects after conducting uji Wilcoxon found an association between hormonal contraceptive use and weight gain ($p = 0.001$), and the chi-square test showed a relationship between the length of contraceptive use and weight gain ($p = 0.001$). **Conclusion:** Weight gain in mothers is influenced by the length of hormonal contraceptive use. The duration of use of hormonal-type contraceptives needs to be considered as the basis for the realization of a program to prevent weight gain in family planning acceptors.

Abstrak

Latar Belakang: Kontrasepsi hormonal banyak dipilih ibu-ibu untuk mengatur jumlah anak dan jarak kelahiran anak. Namun, penggunaan kontrasepsi hormonal memicu efek samping peningkatan berat badan. Tujuan: untuk mengevaluasi efek antara jenis dan lama penggunaan kontrasepsi hormonal dengan peningkatan berat badan pada akseptor keluarga berencana di Pusat Kesehatan Masyarakat kecamatan Ubud I Provinsi Bali, Indonesia. **Metode:** Studi kohort merupakan desain penelitian bersifat retrospektif. Sebanyak 92 akseptor, yaitu ibu-ibu pengguna kontrasepsi minimal 6 bulan sebagai sampel. Data bersifat sekunder bersumber rekam medis di Pusat Kesehatan Masyarakat yang memenuhi kriteria penelitian. Kuesioner sebagai alat ukur untuk memperoleh data jenis dan lama penggunaan alat kontrasepsi dan berat badan sebelum dan sesudah penggunaan kontrasepsi hormonal. Analisis data bivariat menggunakan uji chi square dan uji Wilcoxon. **Hasil:** Subjek penelitian berjumlah 92 setelah dilakukan uji wilcoxon menemukan ada hubungan penggunaan kontrasepsi hormonal dengan peningkatan berat badan ($p=0,001$) dan uji chi square menunjukkan terdapat hubungan antara lama penggunaan kontrasepsi dengan peningkatan berat badan ($p=0,001$). **Simpulan:** Peningkatan berat badan pada ibu-ibu dipengaruhi oleh lama penggunaan kontrasepsi hormonal. Lama penggunaan kontrasepsi jenis hormonal perlu diperhatikan sebagai dasar perwujudan program pencegahan peningkatan berat badan pada akseptor keluarga berencana.

Introduction

Contraception is widely associated with various sustainable development goals (Dockalova et al., 2016) and can reduce unplanned pregnancies as a priority part of the global health community

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(WHO, 2017). Thus, in Indonesia, it is used as part of building family planning (FP). Family Planning (FP) is one of the most effective ways to improve family resilience, health, and safety of mothers, children, and women (Mulyani & Rinawati, 2016; Pradnyawati et al., 2021). The community of women of childbearing age has used various contraceptives. However, contraception is not entirely safe from side effects. Hormonal contraceptives cause side effects of weight gain (Odelola & Akadri, 2021). Other side effects can occur, such as increased blood pressure (Zerihun et al., 2019) associated with invasive cancer of the cervix and breast cancer associated with long-term use (Bovo et al., 2023; Kamani et al., 2022; Purohit & Soni 2023). This study focused on a retrospective review of hormonal contraceptive use on acceptor weight gain.

Hormonal contraceptives consist of a combination (containing the hormones progesterone and estrogen) and those containing progesterone only. Combined hormonal contraceptives are found in the pill and injection. Hormonal contraceptives that contain progesterone are found in pills or oral, injections, and implants; IUD contraceptives consist of IUDs that contain synthetic hormones (synthetic progesterone) and those that do not contain hormones. Finally, the steady contraceptive method consists of the Female Operative Method (FOM) and the Male Operative Method (MOM) (Cahyawati et al., 2022; Soleha, 2016). Currently, it is known that the achievement of birth control acceptors in Bali in 2019 in April was 554,479 active acceptor participants consisting of 216,882 IUD birth control acceptors (39%), 19,919 implants (3.5%), 212,356 injections (38.2%), and 55,418 (10%) pills (Badan et al., 2019).

Hormonal contraception is a contraceptive that contains the hormones estrogen and progesterone. Estrogen and progesterone work in contraception by providing feedback to the pituitary gland through the hypothalamus so that there is an obstacle to follicle development and the ovulation process. Hormonal contraception consists of three types of contraception as follows: implants, birth control injections, and FP pills (Yancey & Raleigh, 2014). Generally, women who use injectable and oral contraceptives complain of weight gain. This situation occurs because this contraceptive contains estrogen, which is closely related to body fat metabolism (Pratiwi et al., 2014). Previous studies involving 240 subjects using hormonal contraceptives obtained weight gain during use six months (1.5 kg), 12 months (1.9 kg), 18 months (4.4 kg), 24 months (4.5 kg), 30 months (4.9 kg) and 36 months (5.1 kg) (Vickery et al., 2014). The use of hormonal contraceptives as contraceptives in young women also led to a significant increase in serum triglycerides after six months (Yadav et al., 2011). In addition, various studies have also analyzed the effects of hormonal contraceptives on weight loss have been carried out in Northern Ethiopia by Zerihun et al. (2019), in Southwest Nigeria (Odelola & Akadri, 2021), and Indonesia by Kumala (2021) and Mas'udah et al. (2021). In addition, previous studies focused on evaluating the attitudes and actions of 3-month injectable birth control acceptors in overcoming contraceptive side effects (Mamuroh et al., 2019), studying the characteristics and knowledge of birth control pill acceptors with consumption compliance (Virawati, 2023), analysing knowledge of birth control acceptors with side effects of hormonal contraceptives with a duration of 3 months (Rismawanti, 2020), and examining the distribution of husbands' consent regarding family planning program methods, the desire to add children, side effects of family planning, the role of family planning service providers, and the incidence of drop out (Siregar et al., 2022).

Meanwhile, the results of research by Wahyuni and Silvitasari (2022) obtained different results that there was no difference in the duration of hormonal contraceptive use in birth control acceptors with weight gain. Therefore, this study aims to evaluate the side effects of hormonal contraceptive

use and its combination with weight gain in birth control acceptors, especially in the Community Health Center of Ubud I sub-district, Bali Province, Indonesia, due to the use of hormonal birth control contraceptives with high prevalence. The study used a retrospective cohort study design that was able to predict well in this study. The results of the study can contribute to the side effects of weight gain according to the length of hormonal contraceptive use, which is essential to be of concern to acceptors.

Method

This study used a cohort study design with a retrospective data collection method using secondary data sources, namely medical records of hormonal birth control acceptors in 2020. This study was used to evaluate the effects of the type and duration of hormonal contraceptive use on retrospective weight gain of birth control acceptors. The location of the study was carried out at the Ubud I Health Center because it was considered to have a representative data source needed in this study, with inclusion criteria including hormonal contraceptive acceptors who had used contraception for at least six months. Complete data was available in the form of weight records before contraceptive use until the end of contraceptive use. Unreadable medical record data was excluded from the study.

The sample size used using the categorical scale analytical research sample size formula is not paired with the proportion of groups without risk factors set at 0.312. The difference in the proportion of minimal exposure that is considered meaningful is set at 0.2 (Ibrahim, 2016), so the minimum sample number of research is 92 acceptors, which is a selection of samples that meet the research requirements using systematic random sampling.

Data collection using secondary data sourced from qualified medical records. The research instrument used a questionnaire containing the characteristics of respondents (age, occupation, and education) and research variables consisting of (1) type of contraception (progesterone and combination), (2) duration of contraceptive use with parameters of 2-12 months, 12-24 months, and > 24 months, and (3) weight gain with low parameters (0-2 kg), medium (2-5 kg), and height (> 5 kg). The research was carried out after obtaining ethical feasibility, as issued by the Health Ethics and Research Committee of University Warmadewa, with the number 32/Unwar/FKIK/EC-KEPK/IV/2021.

Once the data is collected, it is analysed using computer programs. The analysis carried out includes univariate analysis to see the characteristics of birth control acceptors, including age, occupation, and education, which are described in the form of frequency and percentage distribution. Bivariate analysis with a chi-square test to determine the relationship between the duration of hormonal contraceptive use and weight gain. The Wilcoxon test is used to analyse the relationship between the type of contraception and weight gain. Interpretation of statistical tests using a meaning level of 5% or a p-value of < 0.05.

Result

Characteristics of Respondent

The study subjects involved in this study were 92 people with characteristics as seen in Table 1, mainly over 35 years old (63%), working as housewives (47.8%), and having a high school education level (64.1%). Table 1 showed that from the characteristics of birth control used, the majority of subjects used combined contraception (60.9%), with the majority of use in the range of 12-24

months. Weight gain as an outcome evaluated in this study included an increase in low body weight of 0-2 kg (4.3%), moderate 2-5 kg (31.5%), and height of > 5 kg (64.1%).

Table 1.

Characteristics of Respondent

Variable	Categorical	Frequency (n=92)	Percentage (n=100%)
Age	Less than 35 years old	58	63,0
	More than 35 years	34	37,0
Work	Private officer	25	27,2
	Housewives	44	47,8
	Guru	7	7,6
	Farmer	4	4,3
	Merchant	11	12,0
	Civil state officials (PNS)	1	1,1
	SD	3	3,3
Education	SMP	6	6,5
	SMA	59	64,1
	Bachelor	24	26,1
Types of contraception	Progesterone contraceptives	36	39,1
	Combined Contraception	56	60,9
Duration of contraceptive use	Less (6-12 months)	26	28,3
	Medium (12-24 months)	30	32,6
	Old (> 24 months)	36	39,1
Weight gain	Low (0-2 kg)	4	4,3
	Medium (2-5 kg)	29	31,5
	Height (> 5kg)	59	64,1

Results of Bivariate Analysis

Table 2 shows that the average body weight of study subjects before using progesterone contraceptives was 56.42 kg and increased to 62.1 kg or an average weight increase of 5.68 kg. Meanwhile, study subjects who used combined contraceptives increased their average body weight from 59.86 kg to 66.64 kg after more than six months of contraceptive use or an increase in average body weight of 6.78 kg. The Wilcoxon test obtained a degree of significance of 0.000 ($p < 0.05$), which means that there is a significant difference in body weight before and after the use of hormonal contraceptives, or it can be concluded that both progesterone and combination contraceptives are associated with weight gain.

Table 3 showed that in study subjects who had used hormonal contraceptives for some time, the majority experienced weight gain belonging to the moderate category. In addition, study subjects who had used hormonal contraceptives for a moderate and long period, the majority experienced weight gain that fell into the moderate and height categories. The results of the analysis showed that there was a relationship between the duration of contraceptive use and increased body weight ($p < 0.05$).

Table 2.

The relationship between types of hormonal contraceptives with weight gain

Types of Contraception	Weight			P Value
	Pre-kontrasepsi Mean \pm SD	Post-contraception Mean \pm SD	Δ mean	
Progesterone	56,42 \pm 5,9	62.1 \pm 7.2	5,68	0,0001
Combination	59,86 \pm 8,4	66,64 \pm 8,2	6,78	0,0001

Table 3.

The relationship between the duration of contraceptive use and weight gain

Long Use	Amount of weight gain			P value
	Low	Keep	Tall	
Less	3 (3,3%)	19 (20,7%)	4 (4,3%)	0,0001
Keep	1 (1,1%)	8 (8,7%)	21 (22,8%)	
Long	0 (0%)	2 (2,2%)	34 (37,0%)	
Total	4,3%	31,5%	64,1%	

Discussion

This study aims to evaluate the effect of the type and duration of use of progesterone hormonal contraceptives and combined contraceptives (progesterone and estrogen) on weight gain in acceptors. Family Planning (FP) is an effort to regulate the number of births to be able to form a quality family. Hormonal contraception is a method of contraception that is considered the most effective and *reversible* to prevent pregnancy, so it is one of the most popular contraceptive methods by families in Indonesia. However, unfortunately, the use of hormonal contraceptives is believed to result. In weight gain, although the increase in body weight is said to be not significant between 1-5 kg (Hartono, 2011). Ibrahim's research in 2016 found that the increase in body weight of hormonal birth control acceptors reached more than 2.3 kg in the first year and subsequently increased gradually until it reached 7.5 kg over six years (Ibrahim, 2016).

In this study, as in Table 2, research subjects experienced an increase in body weight after using contraceptives, both progesterone type and combination type. Hormonal contraception is a contraceptive containing the hormones estrogen and progesterone given to birth control participants to prevent pregnancy (Mulyani & Rinawati, 2016). The estrogen component can have a weight gain effect due to fluid restency, while the progestin component affects appetite and weight gain. The results of this study showed that 66.7% of respondents experienced an increase in body weight (De Leo et al., 2016). These results are similar to research conducted by Ulfah (2017) in Grobogan Regency, Central Java, with 78 respondents; it was found that there is a relationship between the type of hormonal contraception and the duration of its use with obesity (Ulfah et al., 2017). The same results were also obtained by Kunang (2020) in Tanggamus Regency, Lampung. The results of this study showed that there was a relationship between the length of use of 3-month injectable birth control Depo Medrosic Progesterone Acetate (DMPA) and an increase in body weight (Kunang et al., 2020).

Gonadal steroid hormone (GSH), in this case, androgens, estrogens, and progestins, are pluripotent signalling molecules with variable biological activity. GSH is said to independently affect weight gain and consumption of fatty foods, including energy expenditure and gastrointestinal function, metabolism, growth, and body composition (Hasan et al., 2013; Putra et al., 2021). The content of progesterone is known to facilitate the change of carbohydrates and sugars into fat. In addition, the hormone progesterone also causes increased appetite and decreases physical activity (Pemayun et al., 2022). The content of the hormone estrogen will cause side effects of salt and water retention, and at high doses can also cause oedema and breast pain (Stachenfeld, 2008). In the use of oral pills, most women experience weight changes due to fluid retention from progestins or estrogens, which result in increased subcutaneous fat, especially in the hips, thighs, and breasts. Weight gain in implanted participants may result from the effects of failure to inhibit pituitary work in secreting hormones that cause increased appetite. Contraceptive injections contain estrogen and progesterone hormones in therapy, so the amount of progesterone and estrogen hormones in the

body will increase, which results in increased appetite and more eating (Khoiriah, 2016; Wiadnjana et al., 2020).

The length of contraceptive use also caused the increase in weight in this study. The results of the analysis in Table 3 showed that there was a relationship between the duration of contraceptive use and weight gain ($p < 0.001$). This result is in line with research conducted by Velayati (2015) in Tasikmalaya, West Java, which obtained the results of a relationship between the type of hormonal contraception used and the length of use on weight gain in women of childbearing age (Velayati, 2015). Similarly, with research by Kunang (2020) in Tanggamus Regency, Lampung shows that there is a relationship between the length of use of 3-month injectable birth control Depo Medrosic Progesterone Acetate (DMPA) and an increase in body weight (Kunang et al., 2020). Meanwhile, Saputri's research (2020) in Surabaya, East Java, found that there was a relationship between the length of use of DMPA injectable contraceptives and weight gain in birth control acceptors, namely the longer the use of DMPA injectable contraceptives, the higher the percentage of weight gain (Saputri, 2020).

The use of hormonal contraceptives does not directly cause weight gain but can affect it through dietary changes. Individuals who use hormonal contraceptives will generally experience an improved diet. This leads to an increase in the amount of food intake, resulting in an increased risk of weight gain (Silva et al., 2018). In addition, at the beginning of use, there can be temporary fluid retention, resulting in a temporary increase in body weight (De Leo et al., 2016). In this study, it was found that the type of contraception used and the length of use were associated with weight gain. The longer the use of hormonal contraceptives, the longer the increase in appetite occurs. This situation causes an increase in food intake, which also lasts a long time, resulting in an accumulative increase in body weight (De Leo et al., 2016; Silva et al., 2018).

The findings of this study are consistent with previous research that hormonal contraceptives cause side effects of weight gain (Kumala, 2021; Mas'udah et al., 2021; Odelola & Akadri, 2021; Yuliasuti et al., 2020; Zerihun et al., 2019). However, it is necessary to study other side effects that can be caused by the duration of hormonal contraceptive use because of possible differences in the characteristics and immunity of acceptors, even though they have been studied in other places or countries. Acceptors need to pay attention to the length of use of hormonal contraceptives with the side effects that can occur, and they can choose safer contraceptives, such as natural methods.

Conclusion

Hormonal contraceptives can cause side effects. Side effects of hormonal contraceptives are related to the length and type. The study found that the type and duration of hormonal contraceptive use increased the effect of weight gain. This study provides information that birth control acceptors should consider the length and type of contraceptive use related to side effects, weight gain, or other effects that can arise or be felt. Acceptors can choose safer contraceptives in addition to hormonal contraceptives. Further research is needed that evaluates various possible side effects of hormonal contraceptive use.

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