



Original Article

Comparison of body weight among hormonal and non-hormonal users in a Malaysian cohort



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المخلص

أهداف البحث: لا تزال زيادة الوزن قضية، لمستخدمات وسائل منع الحمل بسبب زيادة الوزن وانتشار معدل السمنة. تهدف هذه الدراسة المرجعية لمقارنة زيادة الوزن بين موانع الحمل الهرمونية وغير الهرمونية في عيادات الصحة الحكومية في مدينة بهارو، كلنتان، ماليزيا.

طرق البحث: تم مشاركة ما مجموعه 380 سيدة من اللواتي استخدمن نفس وسيلة منع الحمل لمدة 12 شهرا في هذه الدراسة. تم عمل تحليل التباين لمقارنة زيادة الوزن بين مستخدمات موانع الحمل الهرمونية وغير الهرمونية، أثناء دراسة نفس العوامل (العمر، ودخل الأسرة، وعدد مرات الحمل ومؤشر كتلة الجسم الأساسي).

النتائج: كانت الطرق الهرمونية هي الأكثر شيوعا. متوسط زيادة الوزن بين مستخدمات الهرمون (المتوسط المعدل 2.8، فاصل الثقة 95% 2.45، 3.24) أعلى بكثير من مستخدمات الطرق غير الهرمونية (المتوسط المعدل 0.46، فاصل الثقة 95% -0.73، 1.65؛ p -value <0.001)، بعد التحكم في العمر، ودخل الأسرة، وعدد مرات الحمل ومؤشر كتلة الجسم الأساسي.

الاستنتاجات: ينبغي التحقق من إمكانية زيادة الوزن بعد استخدام الطرق الهرمونية وينبغي النظر في خيارات أخرى من الطرق غير الهرمونية للحد من زيادة الوزن.

الكلمات المفتاحية: زيادة الوزن؛ الوزن الزائد؛ البدين؛ موانع الحمل الفموية المركبة؛ الحقن

Abstract

Objectives: Weight gain remains an issue for contraceptive users due to the high prevalence of obesity. This retrospective study compares the weight gain between hormonal and non-hormonal contraceptive users in government health clinics in Kota Bharu, Kelantan, Malaysia.

Methods: A total of 380 women who had used the same contraceptive method for at least twelve months were recruited in this study. Covariance analysis was done to compare the weight gain between hormonal and non-hormonal contraceptive users, while studying the same confounders [age, household income, number of pregnancies, and baseline body mass index (BMI)].

Results: Hormonal methods were more commonly used. The mean weight gain among hormonal users (adjusted mean 2.85, 95% CI 2.45, 3.24) was significantly higher than non-hormonal users (adjusted mean 0.46, 95% CI -0.73, 1.65; p -value <0.001), after controlling for age, household income, number of pregnancies, and baseline BMI.

Conclusion: The possibility of weight gain following the use of hormonal methods should be investigated and non-hormonal methods should be considered to prevent weight gain.

Keywords: Combined oral contraceptives; Injections; Obese; Overweight; Weight gain

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Introduction

Introduction of highly efficacious modern contraceptives has contributed significantly to averting maternal mortality while promoting the wellbeing of women and children.¹ Modern contraceptives include hormonal methods such as oral contraceptive pills, hormonal injections, and implants as well as non-hormonal methods such as male condoms and copper intrauterine devices, all of which are medical procedures or products that interfere with reproduction following sexual intercourse.² Despite their benefits, modern contraceptive use in Malaysia has remained unchanged for the past thirty years, used by only approximately 30% of women, partly due to the experience of adverse effects.^{3–5} This study was conducted in Kota Bharu, the capital of Kelantan, the state in Malaysia with the lowest prevalence of contraceptive use.³

Weight gain was among the most common side effects that led to discontinuing use of contraceptives.^{4,6} This was observed in previous studies whereby hormonal methods, particularly depot medroxyprogesterone, led to weight gain.^{7,8} It was postulated that weight gain could be due to fluid retention, fat deposition, or increase of muscle mass.⁹ Malaysia had the highest prevalence of overweight adults in South-East Asia at the time.¹⁰ As being overweight and obesity are associated with various comorbidities, prevention of obesity is a crucial public health agenda.

Based on previous studies, there were inconsistent findings associating weight changes with hormonal contraceptive use.^{9,11,12} The evidence obtained from this study, particularly regarding the extent of weight gained by clients in local settings, will improve the practice of health care providers counselling the most suitable method for clients, especially those who are overweight or obese. Subsequently, compliance and continuation of contraceptives can be achieved, along with the prevention and control of contraceptive-related weight gain. Thus, this study aims to compare the body weight change of women using either hormonal or non-hormonal contraceptive methods in government health clinics in Kota Bharu in 2013–2014.

Materials and Methods

Study design and participants

This retrospective cohort study was conducted in Kota Bharu, located in the north-eastern part of Peninsular Malaysia. It involved a secondary record review of women within the reproductive age group who were registered with the family planning services and used the same contraceptive method for at least twelve months. All of the government health clinics in Kota Bharu between 2013 and 2014 were included. The records of women who lacked even one of these qualifications were excluded.

Sample size was calculated using the Power and Sample Size Calculations (PS Software) version 3.0¹³ for comparing 2 means of body weight change between hormonal contraceptive users and those who used non-hormonal methods. The standard deviation of weight change at twelve months between different methods of contraception was taken as 5.47.¹² The detectable difference in weight

change was set at 2.0 kg. Z_{α} was 1.96 for $\alpha = 0.05$ (95% CI) and Z_{β} was 0.84 for a power of 80%. The proportion of hormonal contraceptive users was 0.71 and those who used non-hormonal methods was 0.24.¹⁴ The ratio between hormonal contraceptive users (control) and those using non-hormonal methods was 0.338. The required sample size was 313 women.

The family planning registers in all twelve health clinics located in Kota Bharu were screened to obtain the total number of clients. The records from the Family Planning Cards were reviewed to select those who fulfilled the inclusion and exclusion criteria. A sampling frame was formed from a list of women using the same modern contraceptive method for at least twelve months from all twelve of the health clinics managed by the Ministry of Health in Kota Bharu in 2013–2014.

Research tools and materials

This study utilized data based on the information available in the Family Planning Cards (PKW 1 (a)/06), which consisted of information on women using any of the contraceptive methods provided by government health clinics, including contraceptive pills (either combined or progestogen-only), injections (Depo-Provera), condoms, and intrauterine devices (copper). The information was obtained by medical officers or nurses during clinic visits. There were two copies of each card; one copy was retained by the women and the other copy, containing similar information, was available at the health clinics. The card consists of the client's biodata, obstetrical and gynaecological history, family planning history, health status of the client, treatment notes on follow-ups, and six-monthly examination findings.

A proforma was used to record all required information, including socio-demographic data (age, race, education level, employment status, household income, number of pregnancies, baseline weight and body mass index (BMI) of women, and weight at twelve months after contraceptive use). This was done by a single researcher. Weight change refers to the difference in weight at twelve months with the weight at baseline (prior to contraceptive use). For this study, modern contraceptive methods were classified into either hormonal (contraceptive pills, either combined or progestogen-only, as well as injections) or non-hormonal (condoms and intrauterine devices).

Statistical analysis

Data were entered and analysed using IBM SPSS version 24.¹⁵ Data were tabulated for descriptive statistics to summarize the socio-demographic characteristics of the women. Categorical variables were described as frequency (n) and percentage (%). Numerical variables were expressed as mean and standard deviation (SD) or median and interquartile range (IQR) depending on the normality of distribution. Body weight change was calculated as the difference in weight at twelve months with the baseline weight at the start of contraceptive use. The body weight changes for hormonal and non-hormonal methods were expressed as mean and standard deviation (SD) for each method. The dependent variable was weight change measured in

kilograms (kg) (from baseline weight to weight at twelve months), the independent variable or factor is the current contraceptive method (hormonal vs. non-hormonal). The selected confounders based on literature were age, number of pregnancies, baseline BMI, and household income. An independent *t*-test was performed for univariable analysis. Analysis of covariance (ANCOVA) was used to test the hypothesis after controlling for confounders. The main effect model was determined. The interactions between study factor and each covariate as well as the assumptions were then checked. The final model was then fitted, and adjusted means were obtained.

Ethical clearance approval was obtained from our institution and the National Medical Research Register, Ministry of Health.

Results

A total of 3630 records were registered from January 2013 until December 2014. Only 812 records (22.4%) fulfilled the twelve-month duration usage of the same contraceptive method. Out of these, 380 records fulfilled the inclusion criteria and all of them were included in the study.

Table 1 shows the socio-demographic characteristics of the women and types of modern contraceptives used. The mean (SD) age of the women was 29.02 (6.83) years, ranging from 16 years old to 49 years old. The majority of the women were Malay (96.3%), had a secondary education (76.6%),

and were housewives (71.8%). The mean (SD) number of pregnancies was 2.84 (1.96) and all of them had been pregnant before. About half of them had normal BMI (49.2%) and 39.0% were overweight or obese. A majority (89.5%) used hormonal methods with the most common being combined contraceptive pills (44.2%) and injections (31.6%). Intrauterine devices were used by less than 5.0% of the women.

Body weight change by contraceptive method

All women demonstrated weight gain after twelve months with mean (SD) for weight gain of 2.6 (3.78) kg. Table 2 illustrates the body weight change for each type of contraceptive method. The mean body weight gain among women using hormonal contraceptive methods in Kota Bharu in 2013–2014 was significantly different from those using non-hormonal contraceptive methods (adjusted mean 2.85 vs. 0.46, *p*-value <0.001) after controlling for potential confounders of age, number of pregnancies, baseline BMI, and household income (Table 3). The highest weight gain was among those who used injections followed by users of combined contraceptive pills.

The interactions between contraceptive method and each covariate (age, number of pregnancies, baseline BMI, and household income) were not significant, with *p*-value more than 0.05. The assumptions were checked: the residuals were normally distributed; there was an equal variance of residuals; the residuals appeared to be linear when the linearity of each covariate and residuals were checked; and the assumption of homogeneity of regressions was also met. The overall model fit. Although it appeared to be an underpowered analysis, due to unequal sample size between hormonal and non-hormonal contraceptive users, the homogeneity of variance assumption was met.

Discussion

Based on this study, only 22.4% of women continued using the same contraceptives for at least twelve months. Based on previous studies, the possible explanations for stopping or discontinuing contraception included wanting to conceive, husband's objection, and experiencing side effects such as weight gain, menstrual changes, or other symptoms^{3,4,16}

Table 1: Socio-demographic characteristics of the women and types of modern contraceptive methods used by women (n = 380).

Variable	Mean (SD)	n (%)
Age of women (year)	29.02 (6.83)	
Race		
Malay		366 (96.3)
Non-Malay		14 (3.7)
Education level		
No formal education		3 (0.8)
Primary education		22 (5.8)
Secondary education		291 (76.6)
Tertiary education		64 (16.8)
Employment status		
Housewife		273 (71.8)
Working		107 (28.2)
Monthly household income (RM)	1000.00 (938.00) ^a	
Number of pregnancies	2.84 (1.96)	
Baseline BMI (kg/m ²)	24.35 (5.19)	
Underweight		45 (11.8)
Normal		187 (49.2)
Overweight		91 (24.0)
Obese		57 (15.0)
Types of modern contraception		
Hormonal methods		340 (89.5)
Combined contraceptive pills		168 (44.2)
Progestogen-only pills		52 (13.7)
Injections		120 (31.6)
Non-hormonal methods		40 (10.5)
Male condoms		25 (6.6)
Intrauterine device (IUCD)		15 (3.9)

^a Median (IQR).

Table 2: Body weight change based on the type of contraceptive method (n = 380).

Types of contraceptive method	n (%)	Body weight change (kg)
		Mean (SD)
Hormonal methods (n = 340)		
Combined contraceptive pills	168 (44.2)	2.40 (3.98)
Progestogen-only pills	52 (13.7)	1.25 (3.24)
Injections	120 (31.6)	4.07 (3.54)
Non-hormonal methods (n = 40)		
Male condoms	25 (6.6)	0.64 (2.21) ^a
Intrauterine contraceptive device (IUCD)	15 (3.9)	0.50 (1.00) ^a

^a Median (IQR).

Table 3: Mean body weight change by contraceptive method after controlling potential confounders (n = 380).

Contraceptive method	n	Weight change (kg)				F stat (df)	p-value
		Mean (SD)	Adj. mean (95%CI) ^a	Adj. mean diff (95% CI) ^b			
Hormonal	340	2.81 (3.85)	2.85 (2.45, 3.24)	2.38 (1.14, 3.64)	13.78 (1, 371)	<0.001	
Non-hormonal	40	0.75 (2.48)	0.46 (-0.73, 1.65)				

^a Adjusted mean using ANCOVA after controlling for age, number of pregnancies, baseline BMI and household income.

^b Least square difference for 95% CI for difference.

The majority of women in this study used hormonal contraceptive methods, which is similar to most studies.^{3,4,14} Contraceptive pills and injections were the two most common contraceptive methods used in this study. The contraceptive pills were generally more widely used³ but the longer-lasting contraceptive methods, particularly Depo-Provera injections, were gaining popularity among contraceptive users, particularly in Kelantan.¹⁴ Similar trends can be seen in other countries such as Belgium, Bangladesh, the United States of America, Spain, Germany, the Netherlands, Portugal, Canada, Australia, and France. These countries had more hormonal users with the last three countries having more women using contraceptive pills.¹⁷⁻¹⁹ Conversely, in Turkey many women preferred non-hormonal methods with younger women preferring male condoms and older women preferring intrauterine contraceptive devices (IUCD).¹⁸

Ease of use and presence of regular menstrual bleeding were among the reasons stated for women's preference for contraceptive pills.²⁰ Conversely, a 'method which lasts longer' and being 'forgettable' were qualities that led women to choose longer-acting methods such as Depo-Provera injections and IUCD,²¹ thus contributing to the increase in usage of these methods. The use of condoms was low (less than 10%) in this study, which was similar to most other studies.^{3,14} Despite preventing and protecting from HIV and other sexually transmitted infections, the unpopularity of condoms may be explained by its interference with sexual intercourse and the need for cooperation from the male partner.¹⁴ The use of IUCD was also very low, which was consistent with other findings.³ Despite IUCD being proven safe and highly effective in preventing pregnancies as well as provided for free in the government health clinics, women were still hesitant about using them.²² This indicates a lack of knowledge about IUCD among women, which may be attributed to a bias among the health care providers reluctant to offer IUCD and hesitant to insert IUCD for their clients.^{23,24}

Misconceptions and fear of using a particular method may be addressed during counselling sessions, which may change women's perceptions and acceptance.²⁰ This demonstrates the importance of the knowledge, training, and skills of health care providers and the importance of correcting any misconceptions among this group, since they exert influence on clients' decision making.²⁴

The determinants of contraceptive use also include their accessibility and availability. In Malaysia, services are provided by many agencies though not all methods are available at all centres.³ It is timely that the services be upgraded to include a wider choice of contraceptives that are safe,

longer-lasting, acceptable, effective, and not dependent on the users' compliance or continuance of the contraceptive method.^{25,26}

This study demonstrated that women using hormonal contraceptives had significantly higher body weight change after twelve months of use as compared to non-hormonal contraceptive users. The highest weight gain was with Depo-Provera injections, which was similar to other studies.^{7,8,27} The mechanism in which hormonal contraceptive users gained weight was believed to be either through fluid retention or fat deposition.⁹ Given that Depo-Provera was gaining popularity among contraceptive users in Kelantan, the main concern was due to previous studies finding that the increase was in total fat and visceral fat, which is a basis for the development of metabolic syndrome, as opposed to an increase in lean mass.^{7,8} This study presented conflicting findings from prior studies^{9,12,28} and associated weight gain with hormonal contraceptive use, thus justifying the need for this study in providing local evidence in Malaysia for weight gain among hormonal contraceptive users.

Based on the findings from Malaysia's Ministry of Health,²⁹ 30.0% of the population were overweight and 17.7% were obese. In our study, more than one-third of the respondents belonged to the overweight and obese group, whereas 24% of the women were overweight and 15% were obese, which corresponded with the findings from the Ministry of Health. Hence, there is a need to propose more options for available contraceptive methods to women, particularly the non-hormonal methods that have a negligible effect on weight. Health care providers need to increase promotion of non-hormonal methods such as male condoms, which prevent sexually transmitted diseases, and intrauterine devices, which are long-acting, reversible contraceptives with insignificant effects on weight. For women who are using hormonal contraceptive methods, advice on weight management through healthy nutritional intake and regular physical activity needs to be delivered to reduce the probability of significant weight gain, a risk factor for non-communicable diseases.

Strength and limitation of the study

Although previous research has been conducted on weight gain among contraceptive users, we found that the current study was the first conducted in this local setting that identified the problem of weight gain among modern contraceptive users. This is especially surprising in a country with a significantly high prevalence of obesity in South-East Asia. Furthermore, data collection and entry were undertaken by single researcher to avoid bias and data entry error.

The main limitation of this study was the utilization of secondary data with as much as 53% of the data missing. This resulted in the expected sample size for control not being met. This study also included only government health clinics, possibly excluding women who obtained contraceptive methods from private clinics.

Conclusion and recommendations

It is necessary to strengthen the family planning services through the provision of knowledge and offering of various contraceptive methods, including the non-hormonal methods. This is of utmost importance since the non-hormonal contraceptive methods also confer additional benefits, such as protection against HIV and sexually transmitted infections among male condoms users as well as effective long-term contraception among IUCD users. In addition, hormonal contraceptive users should be encouraged to achieve their ideal body weight through healthy dietary intake and physical activity to reduce the risk of developing non-communicable diseases.

Future research needs to explore the determinants of contraceptive use, such as source of family planning as well as spousal communication and approval, in addition to the preference among health care providers. Studies are also needed to explore the group of women who are at risk of discontinuing contraceptives, as well as to identify the methods with the highest discontinuation rate and the reasons for discontinuation for each contraceptive method. The use of primary data, a qualitative study, and a larger population may provide better understanding of this topic.

Conflict of interest

The authors have no conflict of interest to declare.

Ethical approval

This research project obtained ethical approval from the Human Research Ethical Committee, Universiti Sains Malaysia (USM/JEPeM/15120561) and the National Medical Research Register, Ministry of Health (NMRR-15-2184-28516).

Authors' contributions

HI constructed and designed the study, conducted research, and collected and analysed data. TATI revised the process and development of the manuscript by acting as supervisor. NH provided support and acted as field supervisor. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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