



## Impact of Hormonal Contraception Use on Weight Gain Among Women In Assiut Governorate

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### ABSTRACT

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**Key Words:**

Weight gain;  
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**Background:** Weight gain is commonly reported as a side effect of hormonal contraception and may lead to discontinuation or reluctance to initiate. **Objective:** To identify the impact of hormonal versus non-hormonal contraception use on the risk of developing obesity and overweight among women in Assiut governorate. **Method:** A cross-sectional study was conducted on 400 women in reproductive age group (18-49 years old) using contraception for at least one year. Both hormonal (combined hormonal and progestin only) and non-hormonal methods were included. Interview questionnaire covering sociodemographic, reproductive data, risk factors related to weight gain, and type of contraceptive was used. **Results:** Most of the women (85.7%) were using hormonal contraception while non-hormonal contraception was used by 14.3% of the examined women. The prevalence of weight gain was significantly higher among hormonal users than non-hormonal users (62.1% versus 45.6%,  $p=0.019$ ). The mean weight gain among hormonal users was slightly higher than non-hormonal users but without significant difference ( $6.04\pm 4.36$  versus  $5.98\pm 4.84$  kg,  $p=0.685$ ). The mean weight gain among hormonal users was significantly increasing with the increase of duration of use ( $p$ -value  $<0.001$ ). Multiple logistic regression analysis showed that weight gain was associated with increase of appetite, not overweight/obese at baseline, no coffee intake, duration of method use  $>2$  years, amenorrhea, and less healthy nutrition. **Conclusion:** The prevalence of weight gain was higher among hormonal contraception users and is related to specific woman criteria. Clinicians should assess the eligibility for a particular method of contraception and monitor weight gain.

### INTRODUCTION

Family planning as one of the Government's programs for development, strived to promote welfare by creating small and happy families. One of the main efforts in Family Planning is birth arrangement, and success of birth arrangement is related to the use of contraception.<sup>1</sup> Worldwide in 2017, 63% of women in reproductive age were using some form of contraception. Contraceptive use has increased in many parts of the world, especially in Asia and Latin America, but continues to be low in sub-Saharan Africa.<sup>2</sup> In Egypt according to DHS 2014, 59% of currently married women are using a

contraceptive method. Family planning as one of the Government's program for development, strived to promote welfare by creating small and happy families.<sup>3</sup> One of the main efforts in Family Planning is birth arrangement, and success of birth arrangement is related to the use of contraception.<sup>1</sup> Combined Hormonal Contraceptive methods include oral contraceptive pills, contraceptive patches, vaginal rings and the combination once a month injectable.<sup>4</sup> Evidence based guidance developed through a worldwide collaboration of experts and supported by the United States Agency

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for International Development, the WHO and Johns Hopkins University that most women do not change

**Table (1): Types of Contraceptive methods used by the studied women, Assiut governorate, 2019**

Types of Contraceptive methods used	N	%
<b>Type of method used for at least 1 year:</b>		
Hormonal	343	85.7
Non-Hormonal (CU- IUDs)	57	14.3
<b>Type of hormonal method used for at least 1 year:</b>		
Combined Oral Pills	142	41.4
Progestin only 3 Monthly Injectable	135	39.4
Progestin only Oral Pills	30	8.7
Progestin only Subcutaneous Implant	30	8.7
Combined Monthly Injectable	6	1.7
<b>Duration of use of the method: (years)</b>		
1- < 2	161	40.3
2 - 3	148	37.0
> 3	91	22.8

weight as a result of COCs use.<sup>5</sup> Progestogen only Hormonal Contraceptives include the progestogen-only injectables, contraceptive implants, pills and the levonorgestrel intrauterine device.<sup>6</sup> DMPA is the only hormonal contraceptive that is consistently associated with weight gain.<sup>7</sup> In adolescents, overweight and obese adolescents gained more weight compared with those in the normal weight category.<sup>8</sup> In adult, the non-obese adult DMPA-IM users more likely to gain more weight compared with obese users, in contrast to adolescents. In several studies non-obese women using DMPA-IM gained more weight than obese women.<sup>9</sup> The exact mechanism of reported weight gain in DMPA-IM is not clear. An early study investigated weight changes in women and reported no significant changes in fluid retention, creatinine excretion rate or nitrogen metabolism, and concluded that weight gain was associated with fat deposition.<sup>10</sup> Progestogen only implant single sterile rod containing 68 mg of etonogestrel. In the USA, mean weight gain in implanon (etonogestrel implant) users was approximately 1kg after 1 year and between 1-2 kg after 2 years.<sup>11</sup> This study aims to identify the impact of hormonal versus non-hormonal contraception use on the risk of developing obesity and overweight among women in Assiut governorate.

## METHOD

This is across sectional study conducted on a consecutive sample of 400 women in reproductive age group (18-49 years old) using any contraceptive methods either hormonal such as combined (combined oral pills or combined monthly injectable) and progestin only methods (progestin only oral pills, progestin only 3 monthly injectable, or progestin only subcutaneous implant) or non-hormonal (copper IUD) regularly and continuous for at least one year of family planning clinics was included. Study participants were recruited during attending the family Planning clinics and divided into 200 women from rural areas in Manfalout district Villages and 200 women from urban areas in Assiut city, during the period from September 2018 to January 2019. Any women used the contraceptive methods less than one year was excluded from the study.

Sample size was calculated using Epi-Info, version 7, with the following inputs: The prevalence of obesity among users of modern contraception was ranged from 36.6 %- 37.7% Based on three DHS Surveys, 2002-2012 .Expected frequency (DHS 2012) 37.7%. Confidence limit 5%, Confidence level 95% Sample size (361), to compensate for drop out 10% was added giving a final sample 400 women.<sup>12</sup>

**Data collection tool and techniques:** Data was collected through face to face interviewing of the study participants using the proper pre-coded Arabic questionnaire which had been designed by investigator covering Socio-demographic characteristics (age, residence, education, occupation, family income), Reproductive history (parity, age at menarche, marriage duration), Data on contraceptive utilization (was type of contraceptive method used now at least 1 year, (hormonal contraceptive methods or non-hormonal methods), duration of use of the method.

Physical activity according to Active Australia Physical Activity Questionnaire),<sup>13,14</sup> The instruments measured the number of bouts of vigorous intensity activity that were 20 minutes in duration and bouts of walking and moderate-intensity activity that were 30 minutes in a usual week. Then assessed total activity and categorized into minimal, low, adequate, and high. comparison measures in the classification of participants into sufficiently active (adequate, high), and insufficiently active (minimal, low).

**Table (2): Sociodemographic, Reproductive characteristics, other risk factors for weight change of hormonal and non-hormonal contraception users among the studied women, Assiut governorate, 2019**

Sociodemographic, Reproductive characteristics	Type of method used now for at least 1 year				P-value
	Hormonal methods		Non-hormonal methods		
	N= 343	%	N= 57	%	
<b>Woman's current age:</b>					
Mean ± SD	33.18 ± 6.02		33.74 ± 6.56		0.522
<b>Education:</b>					
Illiterate	95	27.7	15	26.3	0.397
Primary	62	18.1	11	19.3	
Secondary	146	42.6	20	35.1	
University or higher	40	11.7	11	19.3	
<b>Occupation:</b>					
Working	41	12.0	12	21.1	0.061
Not working	302	88.0	45	78.9	
<b>Residence:</b>					
Rural	164	47.8	36	63.2	0.032*
Urban	179	52.2	21	36.8	
<b>Parity:</b>					
1-2	90	26.2	13	22.8	0.692
3-4	168	49.0	27	47.4	
5 or more	85	24.8	17	29.8	
<b>Marriage duration:(years)</b>					
< 10	128	37.3	16	28.1	0.081
10 - 15	110	32.1	15	26.3	
> 15	105	30.6	26	45.6	
<b>Nutrition score:</b>					
Less healthy	228	66.5	39	68.4	0.772
Healthier	115	33.5	18	31.6	
<b>Physical activity score:</b>					
Sufficiently active	190	55.4	31	54.4	0.887
Insufficiently active	153	44.6	26	45.6	
<b>Self-reported increase of appetite after use of method:</b>					
Yes	165	48.1	6	10.5	<0.001*
No	178	51.9	51	89.5	
<b>Obesity in either parent:</b>					
Yes	34	9.9	8	14.0	0.347
No	309	90.1	49	86.0	

Nutritional habits, including the type of fatty matter, type of bread, fresh vegetables and fruits per week, sweets, chocolate needs, soft drinks, juices per week, fast food, number of tablespoons of sugar are used per day, and number of times do you eat snacks between meals per day), This questionnaire comprises questions sourced from previously validated questionnaires and focuses on key dietary habits associated with diet quality and nutritional status. According to the New Zealand Food and Nutrition Guidelines for Healthy Adults (2017). For each participant, a total index score was at least 75% calculated by summing up scores from all index

items, Overall, the HDHI had good internal reliability with Cronbach's alpha coefficient of 0.75.<sup>15</sup> Life style risk factors (smoking, coffee intake, self-increase of appetite) , and the anthropometric measurements was take baseline weight from the Family Planning Cards, which consisted of information on women using any of the contraceptive methods provided by government health clinics, women were weighed on a weighing scale, and the subject's height was measured with a height scale to the nearest 0.1 cm, then the BMI was calculated by using the following formula: BMI = Weight in Kg/Height in (meter)<sup>2</sup>. Initial baseline BMI

**Table (3): Anthropometric measurements according to hormonal and non-hormonal methods among the studied women, Assiut governorate, 2019**

Anthropometric measurements	Type of method used now at least 1 year				P-value
	Hormonal methods		Non-hormonal methods		
	N=343		N=57		
<b>Classification of weight change:</b>	N	%	N	%	
Group 1 (Weight gain)	213	62.1	26	45.6	0.044*
Group 2 (No change)	85	24.8	18	31.6	
Group 3 (Weight loss)	45	13.1	13	22.8	
<b>Change of weight: (kg)</b>					
Mean ± SD	3.21 ± 5.37		1.58 ± 6.12		0.021*
Median (Range)	2.0 (-15.0 -25.0)		1.0 (-19.0 -20.0)		
<b>Weight gain:</b>					
Yes (group 1)	213	62.1	26	45.6	0.019*
No (group 2,3)	130	37.9	31	54.4	
<b>Weight gain: (kg)</b>					
Mean ± SD	6.04 ± 4.36		5.98 ± 4.84		0.685
Median (Range)	5.0 (2.0-25.0)		4.0 (2.0-20.0)		

**Table (4): Weight change among hormonal and non-hormonal methods users of the studied women, Assiut governorate, 2019**

Weight change	Baseline weight(kg)	Current weight (kg)	P-value
	Mean ± SD (Range)	Mean ± SD (Range)	
<b>Hormonal methods</b> N=343	67.47 ± 11.97 (45.0-99.0)	70.68 ± 11.97 (45.5-108.0)	<0.001*
<b>Non-hormonal methods</b> N=57	69.82 ± 13.87 (48.0-104.0)	71.40 ± 12.82 (47.0-98.0)	0.057

before use of method, initial baseline overweight or obesity, current weight, current BMI after use of method at least one year, then classified the observed weight change into 3 groups G1 (Wt. gain) if weight increase 2 Kg or more, G2 (No change) if weight changes less than 2 Kg in either direction and G3 (Wt. loss) if weight decrease 2 Kg or more and then we create a dichotomous variable for perceived weight gain: yes (perceived weight gain G1) or no (no perceived weight gain G2,3).<sup>16,17</sup>

**Statistical Analysis:** Data entry and data analysis were done using SPSS version 22 (Statistical Package for Social Science). Data were presented as number, percentage, mean, and standard deviation. Chi-square and Fisher Exact tests were used to compare between qualitative variables. Independent samples t-test test was used to compare between two quantitative variables and ANOVA test for more than two groups for parametric data. Mann-Whitney

test was used to compare between two quantitative variables in case of non-parametric data. Paired t-test was done to compare quantitative variables before and after method use. Multiple logistic regression analysis was done to measure the risk factors. P-value considered statistically significant when  $P < 0.05$ .

## RESULTS

This is a cross-sectional study conducted on 400 family planning clients, 2019. Table (1) shows that most women (85.7%) used hormonal contraception while non-hormonal contraception use was 14.3%. The highest methods used were combined oral pills (41.4%) and the progestin only 3 monthly injectable (39.4%). Most of the participants used the contraceptive methods one to less than two years (40.3%), and 2-3 years (37.0%).

Table (2) shows the comparison of sociodemographic characteristics among hormonal and non-hormonal users, showed that there was significant difference regarding residence (p-value 0.032), and increase of appetite (P-value <0.001). While there was no significant difference regarding age, education, occupation, parity, marriage duration, nutrition score, physical activity score, and obesity in either parent (P-value 0.522, 0.397, 0.061, 0.692, 0.081, 0.772, 0.887, 0.347), respectively. Table (3) shows that there was significant difference among hormonal and non-hormonal contraception users regarding classification of weight change, change of weight, and weight gain (P-value 0.044,

**Table (5): Weight gain according to initial baseline weight among hormonal and non-hormonal methods users of the studied women, Assiut governorate, 2019**

Type of method	Weight gain	Initial baseline overweight or obesity before use of method				P-value
		Yes (Overweight, Obese)		No (Normal, Underweight)		
		N= 250	%	N= 150	%	
Hormonal methods	Yes	115	54.5	98	74.2	<0.001*
	No	96	45.5	34	25.8	
	Mean ± SD	5.81 ± 4.00		6.31 ± 4.76		
Non-hormonal methods	Yes	16	41.0	10	55.6	0.306
	No	23	59.0	8	44.4	
	Mean ± SD	6.66 ± 4.48		4.90 ± 5.45		

**Table (6): Relation between weight gain and duration of hormonal contraceptive methods use among the studied women, Assiut governorate, 2019**

weight gain and duration	Duration of use of the hormonal method (years)						P-value
	1- < 2		2 - 3		> 3		
	N=138	%	N=132	%	N=73	%	
<b>Weight gain:</b>							
Yes	65	47.1	92	69.7	56	76.7	<0.001*
No	73	52.9	40	30.3	17	23.3	
<b>Weight gain:</b>							
Mean ± SD	4.67 ± 3.52		5.49 ± 3.54		8.54 ± 5.39		<0.001*
(Range)	(2.0-19.0)		(2.0-18.0)		(2.0-25.0)		

0.021, 0.019), respectively. While there was no significant difference regarding mean weight gain (P-value 0.685).

Table (4) shows that there was significant increase of weight among hormonal users (P-value <0.001) while there was not significant among non-hormonal users (P-value 0.057).

Table (5) shows that among hormonal methods users, the weight gain was significantly more frequent among those who was underweight and normal weight (74.2%) (P-value <0.001) while was not significant among non-hormonal methods users (P-value 0.306).

Table (6) shows that there was significant difference among hormonal methods users regarding weight gain, and mean weight gain (P-value <0.001, <0.001), respectively.

Table (7) shows multiple logistic regression analysis for various risk factors of weight gain among hormonal contraceptive users was associated with increase of appetite, not overweight/obese at baseline, no coffee intake, duration of method use >2 years, amenorrhea, and less healthy nutrition.

## DISCUSSION

This study revealed that hormonal contraceptive methods were more commonly used, most women

(85.7%) used hormonal contraception while non-hormonal contraception use was (14.2%). The highest methods used were Combined Oral Pills, and the Progestin only 3 Monthly Injectable. Our results are similar to a Malaysian cohort study showed that the majority used hormonal methods with the most common being combined contraceptive pills followed by injections. Intrauterine devices were used less than 5.0% of the women.<sup>18</sup> Similar trends can be seen in both developed and less developed countries such as Belgium, Bangladesh, and United States, these countries had more hormonal user using contraceptive pills (29.0%) , followed by injectables (14.4%), IUDs (0.8%).<sup>19,20</sup>

This study found that the percentage of weight gain (>=2kg) was significantly higher among hormonal than non-hormonal methods users. There was no significant difference between mean weight gain among groups. The results of the present study agree with many other studies from different parts of the world. For example, Study in Malaysia, the mean weight gain among women using hormonal contraceptive methods was significantly different from those using non-hormonal contraceptive methods for at least 12 months. The highest weight gain was among those who used injections followed

**Table (7): Multiple logistic regression analysis for predictors of weight gain among hormonal users of the studied women, Assiut governorate, 2019**

Multiple logistic regression analysis	P-value	OR	95% C.I.	
			Lower	Upper
Increase of appetite	<0.001*	34.940	14.783	82.580
Not initial baseline overweight/ obese	<0.001*	4.436	2.121	9.279
Physically insufficiently active	0.321	1.426	0.708	2.871
No coffee intake	0.017*	3.601	1.255	10.335
<b>Duration of method use:</b>				
2 - 3	0.020*	2.668	1.166	6.105
> 3	0.005*	4.520	1.595	12.812
Amenorrhoea	0.012*	2.436	1.217	4.876
Not currently breastfed	0.083	2.664	0.881	8.052
Less healthy nutrition	<0.001*	3.542	1.759	7.130

by users of combined contraceptive pills.<sup>18</sup> Other studies analyzed weight variations in Brazilian women using DMPA, LNG-IUS or Cu-IUD. After 10 years of use, Users of hormonal and non-hormonal contraceptive methods gained a significant amount of weight over years. Consequently, the weight gain is related to ageing, changes in lifestyle, mainly sedentary life, and excessive food intake.<sup>21,22</sup> In contrast other studies showed non-significant change of weight like study in Egypt over 3 years recruiting overweight and obese women above the age of 35 years who were divided into two groups who received COCs for 36 cycles, and control group to whom Cu-IUD was inserted, there was no significant change in the body weight after 12, 24 and 36 cycles of use.<sup>23</sup> Studies in USA, Poland and Germany compared weight change at 12 months between 3 progestin-only contraceptive methods, COC with the NH Cu-IUD users. There was neither significant weight gain nor significant increases of BMI.<sup>17,24,25</sup>

This study revealed that among hormonal methods users, the percentage of weight gain was significantly more with who was underweight and normal weight. Several studies have been published that suggest that non-obese adult DMPA-IM users may be more likely to gain weight compared with obese users, in contrast to adolescents.<sup>9,26,27</sup> This study revealed that the percentage of weight gain, mean weight gain, and mean weight change were significantly correlated to the duration of hormonal contraception use. Similar to other studies showed that longer use of hormonal contraception related to higher risk of obesity due to a cumulative effect of the contraceptive on the system over time.<sup>1,26,28-30</sup>

This study revealed that the significant predictors for weight gain among hormonal contraceptive

methods users were increase of appetite, with no coffee intake, with duration of methods use > 3 years and 2 - 3 years, with amenorrhoea, and less healthy nutrition. Weight gain among hormonal users was related to their higher appetite and subsequently higher dietary ingestion as a result of modifications of the hypothalamic appetite control center by DMPA, causes increase in the level of GnIH releasing cells, projected to appetite regulating cells within the lateral hypothalamic area and GnIH related to peptides significantly stimulated food intake.<sup>31,32</sup> Another mechanism of weight gain with hormonal contraception that due to an increase in one or more factors of fluid retention, muscle mass and fat deposition. Also, COCs could result in increased food intake through a physiological effect on appetite.<sup>33</sup>

#### **Strength of this Study**

This study includes wide variation of population in different areas rural and urban. The study followed up healthy adult women not suffered from any disease or any symptoms of any disease. Factors that may have affected weight gain such as nutritional habits and the practice of physical activity could be evaluated. The results of our study may be generalizable to other Egyptian women seeking contraception as our study population was from urban and rural geographical areas.

#### **Limitation of this Study**

This study included only government health clinics, possibly excluding women who obtained contraceptive methods from private clinics. Also, this study was cross-sectional which may introduce bias.

#### **CONCLUSIONS**

Based on this study, most women prefer using hormonal contraceptive methods; only few women

used non-hormonal contraceptive methods. More than half of the participants had weight gain among hormonal contraceptive users. Mean weight gain was higher among hormonal contraceptive users than among non-hormonal contraceptive users. Among hormonal methods users, the weight gain was highly significantly more with who was underweight and normal weight than overweight and obese. Also, there was highly significant difference in weight gain regarding the duration of hormonal contraceptive methods use from less than 2 years to more than 3 years.

### **Ethical and Approval**

The study protocol was approved by the Ethical Committee of Faculty of Medicine, Assuit University. Approval from higher authority (From the director of the Faculty of Medicine, Assiut University, as well as director of Health directorate in Assiut and Health department of Manfalout was taken was also taken prior to the research. Participants were informed about the objectives, methods, and possible impact of the study and an oral consent was obtained.

### **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 using. Clinicians should always refer to WHO when determining whether a woman is eligible for a particular method of contraception, including women who are overweight or obese. So, it is important for healthcare providers to have an evidence-based understanding of the effect of contraception on weight gain so that they can provide appropriate and accurate counseling to patients. Monitoring of anthropometric measurements of women using certain hormonal contraceptives could contribute to controlling weight gain.

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**Author contributions:** Ereny Edwar Mossad, reviewing literature, collection of data, and analysis and interpretation of data, writing discussion; Faten Mohammed Rabie, choosing the idea and design of study, plan of analysis, and final approval of the version to be published; Ali Hussein Ali Zarzour, analysis and interpretation of data, drafting the article and revising it and final approval of the version to be published.

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