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Evaluation of some Physiological and Biochemical Parameters of Healthy Women Administrated Oral Contraceptive Pills in Gaza City

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Abstract:

Aim: To evaluate some physiological and biochemical parameters of healthy women who administrated oral contraceptive (OC) pills for at least three continuous menstruation in Gaza City.

Subjects and Methodology: The study design was a case control. The experimental sample size was 80 healthy women aged 20-35 years from the Swidey Clinic who had taken OC pills for at least for three continuous cycles. The control sample was healthy married women who were not going on OC before and match the experimental sample in age and residence. The study questionnaire included issues about the following information: age, body mass index (BMI), nature (regular/ irregular) of menstrual cycle (MC), frequency of bleeding and increasing appetite, blood pressure and so on.

Blood parameters analysis of the study population included complete blood count (CBC), C-reactive protein (CRP), high density lipoproteins cholesterol (HDL-C), low density lipoproteins cholesterol (LDL-C), total cholesterol (TC), and triacylglycerol (TAG). Leptin was carried out using a commercially available diagnostic system test kits. SPSS version 13 system was used to analyze obtained data.

Results: Complete blood count (CBC) analysis showed significant differences among the study population with respect to white blood cells count (WBC), lymphocytes (Lymp), Granulocytes (Gran), mean cell hemoglobin (Mch), and red cell distribution width (RDW). For other CBC parameters no significant differences among the population were found.

The results also showed statistically significant differences among study population with respect to nature of menstrual cycle (MC, p= 0.024), increasing appetite (p= 0.002), BMI (p= 0.015), TC (p= 000), LDL-C (p= 0.002), CRP (p= 0.034), and Leptin (p= 0.003). In contrast, the results showed no statistical differences among the study population with respect to systolic blood pressure (SBp, p= 0.139), diastolic blood pressure (DBp, p= 0.382), HDL-c (p= 0.148), and TAG (p= 0.218), Moreover, the results showed a high strong correlation between BMI and leptin (p = 0.000) among the study population.

Key words: Oral contraceptive, Healthy women, biochemical parameters, Gaza city.

تقييم حالة النسوة الأصحاء من مدينة غزة اللواتي يتناولن حبوب منع الحمل من حيث بعض النواحي الفسيولوجية والبيوكيميائية

ملخص:

الهدف: تقييم حالة نسوة أصحاء من مدينة غزة يتناولن حبوب منع الحمل لمدة ثلاث دورات شهرية متتالية على الأقل من حيث بعض النواحي الفسيولوجية والبيوكيميائية

المواد والطرق: تم إختيار مجموعة تجريبية وأخرى ضابط كمنهجية الدراسة، وتكونت المجموعة التجريبية من 80 امرأة صحيحة من عيادة السويدي في غزة، واللواتي يبلغن من العمر من 20 إلى 35 عاما ويتناولن حبوب منع الحمل لمدة ثلاث دورات شهرية متتالية على الأقل، وتكونت العينة الضابطة من نفس العدد من النسوة المتزوجات ويبلغن نفس العمر ويسكن نفس المنطقة.

تكونت أدوات الدراسة من إستبانة تحتوي على أسئلة حول العمر، ودليل الوزن، و طبيعة الدورة الشهرية، وتكرار النزف، والشهية نحو الطعام، وضغط الدم وغير ذلك.

وتم تحليل عينات الدم المأخوذة من مجتمع الدراسة الذي شمل كل من: تعداد كامل لمحتوى الدم، والبروتين المتفاعل، والبروتين الدهني الثقيل، والبروتين الدهني الخفيف، وكولسترول الدم، والدهون الثلاثية، وتم تقدير هرمون اللبتين باستعمال كتات تجارية تشخيصية خاصة بذلك. وأستخدم البرنامج الإحصائي SPSS نسخة 13 في تحليل البيانات الإحصائية التي تم الحصول عليها أثناء الدراسة.

النتائج: أظهرت النتائج أن هناك فروقا ذات دلالة إحصائية بين مجموعتي الدراسة بالنسبة لعدد كرات الم البيضاء، والخلايا الليمفاوية، الخلايا البيضاء المحببة، ومتوسط خلايا الهيموجلوبين، وتوزيع كرات الدم الحمراء، وطبيعة الدورة، وزيادة شهية الطعام، والكلسترول الكلي، والبروتين الدهني الثقيل، والبروتين المتفاعل، ودليل الوزن، وهرمون اللبتين.

ولم تظهر الدراسة أن هناك فروقا ذات دلالة إحصائية بين مجموعتي الدراسة بالنسبة لضغط الدم، و البروتين الدهني الثقيل، كما أظهرت الدراسة علاقة قوية بين دليل الوزن وهرمون اللبيتين.

Introduction:

Oral Contraceptives (OCs) are the most popular method of birth control. The birth control pills (BCPs) stop ovulation, preventing the ovaries from releasing eggs. They also thicken cervical mucus, making it harder for sperm to enter the uterus (Feminist Women's Health Center, 2008).

Combination BCPs contain both estrogen and progesterone. These pills may be monophase, where each of the active pills contains the same amount of estrogen and progesteron, or biphasic, where the active pills contain varied amounts of hormones designed to be taken at specific times throughout the pill-taking schedule (National Women's Health Resource Center Inc, 2009). Synthetic hormones are used in OCs estrogens, such as, mestranol, ethinyl estradiol. Progesterones used in OCs are synthetic

progesterones, such as norethindrone, norgestrel, norethindrone acetate and so on. Different progesterone has different strengths and side effects (Watson Pharma. Inc, 2006).

Progesterone-only pill, or "mini-pill, it's for breastfeeding women because estrogen reduces milk production. It is also taken if women are hypertensive, or at risk for developing blood clots. Minipills are slightly less effective than regular pills and often cause irregular menstrual patterns. Minipills prevent pregnancies mainly by making the cervical mucus impermeable to sperm and by making it more difficult for an egg to attach to the uterus lining (Watson Pharma Inc, 2006).

The pituitary gland produces two hormones called Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH). These hormones serve to stimulate the ovary to produce an egg each month. The ovary is the site of production of the woman's two central female hormones, estradiol, a type of estrogen, and progestin, a type of progesterone. Birth control pills are a combination of synthetic estrogen and progesterone. The pills cause negative feedback on the pulse frequency of gonadotropin-releasing hormone (GnRH) release by the hypothalamus, which decreases the release of FSH and LH by the anterior pituitary. These two hormones are needed for ovulation to occur, therefore, OCs suppress, but do not eliminate ovulation.

Obesity, breakthrough bleeding, nausea, high blood pressure (hypertension), high cholesterol, signs of a blood clot and bloating are some of the more commonly reported OC pills side effects (Bakir and Hilliquin, 1986). On the other hand, BCPs increase a woman's risk to cerebrovascular disease and cervical cancer. A woman taking the pill is 1.9 times more likely to die from cerebrovascular disease and 2.5 times more likely to die from cervical cancer (Life Site News, 1999). Oral contraceptive pills are taken by about 100 million women worldwide. Studies have shown that synthetic hormones used for OC greatly increased the risk of blood clotting. Clots typically form in the legs and can cause serious injury and death if they travel to the heart, lungs or brain (Baklinski, 2008).

High body weight could be also a side effect of OCs intake. Leptin's effects on body weight are mediated through effects on hypothalamic centers that control feeding behavior and hunger, body temperature and energy expenditure. It is a protein hormone with important effects in regulating body weight, metabolism and reproductive function. It also acts as appetite suppressant. It stops eating too much as well as it makes the body more active so it burns off more energy. The amount of Leptin found in people increases as their body fat increases (Zabut et al., 2007; 2008).

Significance and general objectives: Although OC pills are usually used in elsewhere since very long time, no studies were carried out about impact of OC administration on healthy women in Gaza strip. The main objective of this study, therefore, is to evaluate some physiological and biochemical indices of healthy women who administered OC pills for at least three continuous menstruation in Gaza City. More the study concentrated on leptin level and whether it is related to BMI and different lipid profiles among the studied women.

Subjects and Methods

Study design: The study design was a case control.

Target population and sample size: The target population is healthy women aged 20-35 in Gaza City. The experimental sample size was 80 healthy married women aged 20-35 years from the Swidey Clinic who had taken the same OC pills that contain both estrogen and progesterone for at least three continuous cycles. The control sample was healthy married women who were not going on OC pills before and match the experimental sample in age and residence.

Tools of the study: The questionnaire included issues about the following information: age, weight, height, nature of menstrual cycle (regular/ irregular), frequency of bleeding and increasing appetite, systolic and diastolic blood pressures.

Blood sampling and processing: About 6 ml fasting blood was collected from each women in the study sample. About 4 ml of the blood was collected in a tube without anticoagulation. Then, serum sample was obtained by centrifugation at 3000 rpm for 20 min . The separated serum was divided into two plastic tubes. One sample was stored at 2-5˚C for no more than 24 hours prior to blood parameters analysis, and the other was stored frozen at -70˚C for leptin determination. The remainder quantity of the blood (2ml) was placed into EDTA tube to perform CBC test.

Complete blood count determination: Routine hematological parameters were carried out using an 18 automated parameter hematology analyzer, ABX, Micros 60 from Horiba ABX, France.

Lipid Profile analysis: Lipid profile analysis included cholesterol, high density lipoprotein-cholesterol (HDL-c), low density lipoprotein-cholesterol (LDL-c), and TAG was carried out using a commercially available diagnostic system (GmbH-Germany) test kits (Friedewald et al., 1972; Lopes-virella et al., 1977; Deeg & Ziegenhorn, 1983; Cole et al., 1997;). .

Serum leptin analysis: Frozen serum samples were thawed at 4-8 ˚C and then mixed by gentle shaking at room temperature prior to use. Determination of human leptin and human OB-Re level were carried out by

competitive enzyme immunoassay technique using ELIZA kits from Diagnostic System Laboratories, Texas, USA (Diagnostic System Laboratories, ELISA Kit).

C-reactive protein test: The CRP reagent kit was used for qualitative testing of CRP in human serum (Generic assay Gmbh, 2009).

Pilot study: Pilot study on 10 women who had gone on OCs regimen for at least three cycles was carried out prior the beginning of data collection in order to test the validity and reliability of the questionnaire used. Accordingly, the questionnaire was modified.

Statistical analysis: The obtained data were analyzed by using SPPSS version 13. Frequency and descriptive analyses were used to describe the data. Chi square and Pearson correlation coefficient were used to test the relationship between the variables. Student t-test was also used to differentiate between two numerical data. Any difference or correlation was considered significant if p value was less than 5 %.

Results

The present study was a case control and included 160 women (80 controls and 80 cases). The average age of the control women was 29.75±4.75 years whereas that of the cases was 29.27±4.60 years. The control women also matched the study one in the residence.

Table1 shows that 96.3% of the cases had regular MC, whereas 3.8% of them had irregular one. On the other hand, 83.8% of the controls had regular MC, and 16.3% of them had irregular one. This difference among both groups with respect to nature of MC was statistically significant (χ^2=5.371, P= 0.024).

Table 1: Nature of menstrual cycle of the study population (n=160)

Parameter	case (n=80)		control (n=80)	
	Regular	**Irregular**	**Regular**	**Irregular**
Frequency	77	3	67	13
Percentage	96.3	3.8	83.8	16.3
χ^2	5.371			
P value	0.024			

Table 2 shows that 95% of the cases and 100% of the controls did not suffer from bleeding. This difference among both groups in frequency of bleeding was not statistically significant (χ^2=0.192, P=0.135).

Table 2: Frequency of bleeding among the study population (n=160)

Parameter	Case (n=80)			Control (n=80)		
	Yes	**No**	**Sometimes**	**Yes**	**No**	**Sometimes**
Frequency	0	76	4	0	80	0
Percentage	0	95	5	0	100	0
χ^2	0.192					
P value	0.135					

Table 3 shows that 16.3 % of the cases suffered from an increase in their appetite. In contrast, 2.5 % of controls, OCs increased their appetite. This difference in increasing of appetite among the study population was statistically highly significant (χ^2= 4.386, P= 0.002).

Table 3: Frequency of appetite increasing among the study population (n=160)

Parameter	Case (n=80)			Controls(n=80)		
	Yes	**No**	**Sometimes**	**Yes**	**No**	**Sometimes**
Frequency	**13**	**59**	**8**	**2**	**75**	**3**
Percentage	**16.3**	**73.8**	**10**	**2.5**	**93.8**	**3.8**
χ^2	4.386					
P value	0.002					

The body mass index values of the cases and the controls are illustrated in Table 4. The percent of normal, overweight and obese of the cases were 22.5, 37.5 and 40.0 whereas among the controls were 13.8, 62.5 and 22.5 (χ^2= 7.31, P= 0.015).

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Table 4: Body mass index of the study population (n=160)

BMI	Case n (%)	Control n (%)	P value
Normal	18(22.5)	12(13.8)	χ^2 =7.31 P =0.015
Overweight	30(37.5)	50(62.5)	
Obese	32(40.0)	18(22.5)	
Total	N=80	n=80	

People with BMI=18.5–24.9 were considered to have normal weight, people with BMI=25.0–29.9 were classified overweight, people with BMI≥30.0 were considered obese.

The systolic blood pressure (SBp) values of the cases and the controls are illustrated in Table 5. The percent of normal, low and high Bp of the cases were 53.8, 0.0 and 46.3 whereas among the controls were 51.3, 2.6 and 46.3, respectively (χ^2= 2.351, P= 0.139).

Table 5: Systolic blood pressures among the study population (n=160)

systolic blood pressures (mmHg)	Case n (%)	Control n (%)	P value
Normal blood pressure	43(53.8)	41 (51.3)	χ^2 =2.351 P =0.139
Low Blood pressure	0(0.0)	2(2.6)	
High Blood pressure	37(46.3)	37(46.3)	
Total	N=80	n=80	

People with Systolic Blood Pressure (SBp)= 110-130 mmHg were considered to have normal Bp, People with (SBp) ≥ 130 mmHg considered

to have high Bp, People with (SBp) ≤ 110 mmHg considered to have low Bp (Feng and Graham, 2007).

On the other hand, DBp values of the cases and the controls are illustrated in Table 6. The percent of normal, low and high DBp of the cases were 88.8, 5.5 and 6.3 whereas among the controls were 88.8, 6.3 and 5.1, respectively (χ^2= 1.372, P= 0.382).

Table 6: Diastolic blood pressure among the study population (n=160)

Diastolic blood pressures (mmHg)	**Case n (%)**	**Control n (%)**	**P value**
Normal blood pressure	71(88.8)	71(88.8)	χ^2 =1.372 P =0.382
Low Blood pressure	4(5.5)	5(6.3)	
High Blood pressure	5(6.3)	4(5.1)	

People with Diastolic Blood Pressure (DBp)= 75-85 mmHg were considered to have normal Bp, People with (DBp) ≥ 85 mmHg considered to have high Bp, People with (SBp) ≤ 75 mmHg considered to have low Bp (Feng and Graham, 2007)

Table 7 shows that 13.8% of the cases had positive CRP qualitative test, whereas 5.0 % of the controls had. This difference with respect to CRP test among the study population was statistically significant (χ^2= 5.381, p= 0.034).

Table 7: C-reactive protein test among the study population

Parameter	**Case(n=80)**		**Control (n=80)**	
	Positive	**negative**	**Positive**	**Negative**
Frequency	11	69	4	67
Percentage	13.8	86.3	5	95
χ^2	5.381			
P value	0.034			

As depicted from Table 8, the mean levels (± SE) of serum cholesterol, and LDL-C were significantly higher among the cases (179.05± 4.25, and

97.56±3.97 mg/dl) compared to the controls (157.45± 4.12 and 86.22± 3.35 mg/dl). These differences in cholesterol level among the study population were very significant (p= 0.000 and p= 0.002, respectively).

In contrast, the mean values (± SE) of HDL-C and TAG slightly increased among the cases (51.18± 1.66 and 119.18± 5.95 mg/dl) compared to controls (47.58±1.32 and 108.23± 8.61 mg/dl). These differences in the level of HDL-c and TAG among the study population were not significant (p=0.148 and p=0.218, respectively).

Table 8: Lipid profile among the study population (n=160)

Lipid Profile (mg/dl)	Case (n=80)		Control (n=80)		T	P value
	Mean	S.E	Mean	S.E		
Cholesterol	179.05	4.25	157.45	4.12	3.647	0.000
HDL-C	51.18	1.66	47.58	1.32	1.700	0.148
LDL-C	97.56	3.79	86.22	3.35	2.238	0.002
Triglycerides	119.18	5.95	108.23	8.61	1.047	0.218

S.E: standard error, HDL-c: high density lipoprotein cholesterol, LDL-c: low density lipoprotein- cholesterol. Reference range: cholesterol<200 mg/dl, LDL-C<130 mg/dl, triglyceride 90-150 mg/dl (Mark Cichocki, 2007), HDL-C=40-60 mg/dl (Richard and Fogoros, 2009).

Table 9 shows average (± SE) serum leptin level among the study population. There was a significant increase in the mean level of leptin among the cases compared to the controls (36.32± 2.32 ng/ml vs. 28.56± 2.14 ng/ml, and p= 0.003).

Table 9: Serum leptin level among the study population (n=160)

Parameter (units)	Case (n=80)		Control (n=80)		T	P value
	Mean	S.E	Mean	S.E		
Leptin (ng/ml)	36.32	2.32	28.56	2.14	2.459	0.003

S.E: standard error, T: t-test.

Table 10 shows a positive correlation between leptin level and BMI. This correlation was statistically significant ((r=0.445, p=0.000). In contrast no significant relations were observed between leptin and TC or HDL-C or LDL-C or TAG (p=0.843, p=0.300, p= 0.252 and p=0.397, respectively).

Table 10: The correlation between leptin and lipid profile or body mass index of the study population

Parameter	Leptin	
	Pearson correlation (r)	**P-value**
Total Cholesterol (mg/dl)	-0.023	0.843
HDL-C (mg/dl)	0.177	0.300
LDL-C (mg/dl)	-0.129	0.252
Triglycerides (mg/dl)	0.096	0.397
BMI	0.445	0.000

The tested CBC parameters are illustrated in the table 11. The average (± SE) levels of WBC, Gran and Mch were significantly higher among the cases (7.209± 2.047 K/µL, 60.689± 8.322 % and 26.858± 2.217pg) compared to the controls (6.601± 1.657 K/µL, 54.929± 11.734 % and 25.697± 3.433 pg) with p=0.001, p=0.000 and p=0.003, respectively. The mean (± SE) of Lymph and RDW were decreased among the cases (32.403± 7.280% and 13.366± 1.55%) compared to the controls (36.269± 7.833% and 14.160± 1.545%). These changes were also highly significant (p=0.002 and p=0.001). In contrast, the differences among the study population with respect to Mid, RBc, Hb, Hct, Mcv, Mchc and PLt were not found to be significant

Table 11: Screening of blood count parameters among the study population (n=160)

Blood parameter	Case		Control		T	P value
	Mean	**SD**	**Mean**	**SD**		
WBC (K/µL)	7.209	2.047	6.601	1.657	2.065	0.001
Lymph (%)	32.403	7.280	36.269	7.833	3.233	0.002
Mid (%)	7.797	8.722	8.601	6.551	0.659	0.352
Gran (%)	60.689	8.322	54.929	11.734	3.580	0.000
RBC (M/µL)	4.646	0.683	4.596	0.443	0.558	0.394

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Hb (g/dL)	12.177	0.897	12.250	1.112	0.457	0.387
Hct (%)	37.963	2.448	37.461	3.651	0.967	0.571
Mcv (fL)	80.777	11.942	80.623	8.532	0.094	0.415
Mch (pg)	26.858	2.217	25.697	3.433	2.542	0.003
Mchc (g/dL)	32.495	1.128	32.301	1.693	0.852	0.272
RDW (%)	13.366	1.155	14.160	1.545	3.681	0.001
PLt (K/µL)	279.310	87.585	267.787	74.031	0.899	0.185

WBC: White blood count; Lymph: Lymphocytes; Gran: granulocytes; MID cells include less frequently occurring and rare cells correlating to monocytes, basophils: blasts and other precursor white cells; RBC: Red blood cells; Hb. The hemoglobin; HCT: Hematocrit MCV: mean cell volume; Mch: mean cell hemoglobin; and MCHC: mean cell hemoglobin concentration; RDW. Red cell distribution width; PLt: The platelet count.

Discussion

Birth control pills provide highly reliable contraceptive protection. Even though imperfect use (skipping an occasional pill) is considered, the BCPs are still very effective in preventing pregnancy. This case control study is the first one to determine some risk factors of having BCPs among healthy women in Gaza City. The discussion addressed consistencies and differences between the current findings and other studies carried out in other countries referring to the risk of BCPs.

The study showed that BCPs increased regularity of MC. This finding was very consistent with other studies showed that BCPs are helpful for women periods that come too often or too late. Moreover, they found that menstrual periods tend to be lighter and shorter with BCPs intake.

Thus, regular MC and less blood loss mediated by intake of BCPs is helpful in preventing anemia.

The results showed that continuous OC pills intake leaded to an increase in appetite where there were significant difference among both study groups with respect to this parameter and high BMI. Thus, an increase in appetite leaded to an increase in body weight of the case group. On the other hand, other studies showed that both estrogen and progesterone present in OC pills can cause fluids and salt (sodium) retention (Crystal, 2005).

The results showed significant differences among both study groups with respect to BMI. Body mass index is an indirect method to determine body fat that accumulates in the body if energy input was higher than energy output. These findings were very consistent with the finding that BCPs intake increase an appetite and abnormal high concentrations of serum lipids among women (Reubinoff et al., 1995). Weight gain might be also related to a reduction in physical activity. Progesterone, however, in the OC pills causes an increase in an appetite, and fat deposits. Thus, obese women should look for another method of contraceptives.

The results showed significant differences among both study groups with respect to TC and LDL-c levels in the blood. In contrast, significance difference among both groups with respect to TAG level in the blood was not observed. This finding about effect of BCPs on cholesterol has been reported before (Parks et al., 1989). Thus, women who are going on BCPs regime are more vulnerable to suffer from cardiovascular diseases such as heart attack, stroke, atherosclerosis etc. On the other hand, other studies emphasized that the chances of BCPs contributing to a heart attack are small unless you smoke. Very early, Doar et al. (1969) reported that BCBs were associated with significantly raised mean serum TAG and TC levels.

In contrast to the present findings, Hennekens et al. (1979) reported that**,** the mean level of fasting TAG was higher among current OC users (95 mg/100 ml) than among nonusers (73 mg/100 ml) ($p = 0.002$). After adjustment for the possible confounding effects of age, weight, current cigarette smoking and fasting glucose level, current OC users still had higher TAG blood level than that of nonusers ($p = 0.007$).

Moreover, Parks et al. (1989) observed that OC pills increased TC and TAG concentrations in the blood. Statistically significant increases were observed for TAG, LDL-c, and VLDL-c with the duration of OCs use (Emokpae et al. 2010). This contradiction of the results with respect to blood plasma level of TAG requires more investigation.

The study also showed that values of SBp and DBp remained within the normal range among BCPs women. Early results from a controlled long-term prospective study have shown no significant change in mean systolic or diastolic pressures or mean weight in 31 women after four months on BCPs. But very early study showed a significant change in Bp over the short period of BCPs intake (Weir et al., 1969).In contrast to these findings, Calvin et al. (1969) revealed slightly higher and statistically significant mean SBp and DBp in women using BCPs, after correction for age, height, weight, and arm circumference. One year later, they showed little tendency

for Bp to be affected by BCPs. Moreover**,** Fisch et al. (1977) study showed rise in mean Bp.

The age-adjusted proportion of BCPs users with a Bp over 140/90 mm Hg was about three times that of nonusers. This effect is possibly mediated by the estrogen-induced activation of the renin-angiotensin system. Oral contraceptives also appear to increase the tubular responsiveness to changes in sodium intake. This indicated that synthetic sex steroids have a significant impact on renal function in women (Bertschi et al. (2003). These findings should not prevent continuous monitoring of Bp for several months after the woman start taking BCPs.

The results also showed there was a significant difference among both study groups with respect to leptin. Body fat is responsible for the release of leptin. Positive correlation between serum leptin and BMI was also found ($r=0.56$; $P<0.001$ and $r=0.67$; $P<0.001$). Thus, OCs intake increase an appetite, BMI and leptin level.

In contrast, statistical analysis of other studies did not reveal any significant difference at each investigated time point in either study group with respect to serum leptin or BMI (Rechberger et al., 1995). This contradiction between both studies could be due to type of OCs pills or sample size used.

C-reactive protein (CRP) is a protein in the body whose level increases when blood vessels become inflamed. According to the present results, there was significant difference among both study groups with respect to CRP. This finding was consistent with recent cross-sectional survey demonstrated that CRP levels are significantly increased among OC users versus non-users (Krupa., 2003). Other very recent study showed more than 50 % of apparently healthy women taking OCs had CRP levels >3 mg/l (Rietzschel et al., 2007). These findings indicated that OC pills could cause high-risk of inflammation and thus, could mediate response of immune system.

The results showed a significant difference among both study groups with respect to WBC. An increase in WBC reflected that OCs could cause some type of internal infection among the women. Moreover, the increase in Gran (%) reflects this type of infection to be bacterial. In contrast, the case group showed a significant decrease in lymphocytes. This contradiction with respect to WBC and Lymp requires further investigation.

However, this finding was consistent with another study which showed smoking and Ocs use, alter WBC count among healthy women. However, a total leukocyte count greater than 10,0 /cu mm was found in 44% of obese, heavily smoking women who took OCs as compared to 2% of women without these attributes (Fisch and Freedman, 1975).

The finding showed that there was significant difference with respect a slight increase in Mch % and decrease in RDW %. An increase in % Mch could reflect anemia of chronic diseases. In contrast, the slight increase in % RDW could reflect higher internal iron level among the cases. These findings about effect of BCPs on anemia and internal iron level, however, require further investigation.

Conclusions: Frequent use of BCPs could cause regulation of menstrual cycle, increasing appetite, feeling of headaches as well as increases in appetite, BMI, cholesterol, LDL-C, WBC, Gran, Mch and Leptin among the study population. Thus, monitoring body weight as well as biochemical examinations were recommended to be carried out monthly for every woman who goes on OCs.

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