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The Serious Impaction of Hormonal Contraceptives on Serum Lipid Profile in Sudanese women in Shendi town

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Abstract

Background

Hormonal contraceptive had many side effects include disturbance of serum lipid profile among users, which may lead to serious consequences on young women health.

Objectives

The study intended to examine the impact of using hormonal contraceptive on lipid profile of women at reproductive age.

Methods

This was a case control study conducted in Shendi town in the period from March to August, 2018. It included sixty (60) healthy women, forty (40) of them using hormonal contraceptive and twenty (20) as control group.

Results

The mean of serum total cholesterol in the case group was 168.49mg/dl while it was 136.16mg/dl in the control group, with p .value 0.000, mean level of serum triglycerides in the case group was 120.13mg/dl compared to 106.89mg/dl in control group, with p .value 0.000. There was a significant increase in the serum LDL-c in the case group with a mean value of 88.78mg/dl, and 47.13mg/dl in control group, p .value 0.000. There is also significant decrease of serum HDL-c in case group with the mean value of 35.93mg/dl, and 95.055mg/dl in the control group, the p value 0.000.

Keywords: Hormonal contraceptives, lipid profile, cholesterol

Introduction

Contraceptives are devices or techniques that permit vaginal sexual practice with no risk of pregnancy. ⁽¹⁾Hormonal contraceptives are of special interest due to their various effects on lipid metabolism that may alter lipid profile ⁽²⁾ and hence increase the risk of premature atherosclerosis. ⁽³⁾

Hormonal contraceptives are available in various dosage forms and different routes of administration: oral, intramuscular, transdermal, subdermal implants. ⁽⁴⁾

They have different mechanism of action depending on their type, such as inhibiting the secretion of follicle stimulating and luteinizing hormone and thicken the cervical mucus, ⁽⁵⁾

Today, millions of women are using oral contraceptives for various reasons. ⁽⁶⁾ The use of hormones in birth control began in 1937 when Makepeace, showed that ovulation could be prevented by injecting progesterone into rabbits. In 1959, oral contraceptives were approved in the United States. The use of oral contraceptives has empowered women with effective tools to control their bodies ⁽⁷⁾, but it is not an ideal method for contraception anyhow. The ideal one should be highly effective, with minimal side effects, cheap, independent of intercourse, rapidly reversible, widespread availability, acceptable to all cultures and

religions, easily distributed, and can be administrated by non-healthcare personnel.⁽⁸⁾ Some method of contraception can only be prescribed by a doctor, whereas other can be used without medical advice.⁽⁹⁾ Combined oral contraceptives (COCs) cause slight increases in some procoagulantfactor and reduce the levels of some natural anticoagulant anti thrombin .The effect is marked with third- generation pills (containing degestrol or gestodene) and with second- generation pills (containing levonorgestrel).⁽¹⁰⁾ The most widely available COCs in the public sector contain the progestogens levonorgestrel (LNG) or norethisterone (NET) which is also known as norethindrone.⁽¹¹⁾

The effectiveness of COCs can be reduced if they are taken in combination with other drugs that influence oestrogen/progesterone metabolism (e.g barbiturates, phenytoin, phenylbutazone, rifampicin, griseofulvin) or certain broad-spectrum antibiotics that affect the gastrointestinal flora (ampicillin and tetracyclines).⁽¹²⁾ Combined oral contraception acts both centrally and peripherally. Inhibition of ovulation is by far the most important effect. Both oestrogen and progesterone suppress the release of pituitary follicle-stimulating hormone (FSH) and luteinizing hormone (LH), which prevents follicular development within the ovary and therefore ovulation. Peripheral effects include making the endometrium atrophic and hostile to an implanting the fertilized ovum and altering cervical mucus to prevent sperm ascending into the uterine cavity.⁽¹³⁾

The progesterone-only pills (pop) are ideal for women at times of lower fertility. The POP is taken every day without a break. Particular indication for the POP includes: breastfeeding, older age, cardiovascular risk factors diabetes.⁽¹⁴⁾

Material and Methods

A case control study conducted during the period between March to August 2018 in Shendi town. Forty women using contraceptives were enrolled in this study as test group (n=40) and apparently healthy women not using contraceptive as control group (n=20). Females who had disease diabetes, cardiovascular disease, hormonal disorders, hypertension, hyperlipidemia, alcohol and smoking habits are excluded from study sample.

Ethical consideration

Participant’s who are well informed about the study and accepted to be volunteers are included.

Data collection technique

Information from females using contraceptives was collected using a structured questionnaire.

Samples collection

After 12 hours of fasting, 5 ml of venous blood was collected in dry sterile syringe from each subject (patients and controls). The blood was kept at room temperature for one hour to clot, and was then centrifuged at 2000r.p.m for 5 minutes to separate serum from the cells. Sera were stored at -20 C° until analyzed.

Biochemical analysis

The serum level of TC, HDLC, LDLC, and TG, were estimated quantitatively using enzymatic methods using the kits produced by Biosystem on Biosystem Spectrophotometer Autoanalyzer (Barcelona, Spain).

Statistical analysis

Statistical analysis was performed by the use of SPSS (Statistical Package for the Social Sciences) for windows version 16, with *P*. values < 0.05 were considered as statistically significant **Results:-**

Table (1):-Distribution of age group among women using hormonal contraceptive.

Age (years)	Frequency	Percentage (%)	Laboratory data	Mean (mg/dl)
<20	12	30	S. cholesterol	167.5
			Serum HDL	36.8
			Serum LDL	87.1
			S. Triglycerides	118.7
20-39	28	70	S. cholesterol	169.8
			Serum HDL	35.5
			S. LDL	89.7
			S. Triglycerides	120.9

Table (2):-Lipid profile in case and control group.

Paired for control & case group	Mean (mg/dl)	Sig(p.value)
Tc (control)	136.16	0.000
HDL (control)	95.055	0.000
HDL (case)	35.93	
LDL (control)	46.13	0.000
LDL (case)	88.78	
Serum Triglycerides (control)	106.89	0.000
Serum Triglycerides (case)	120.13	

Table (3):-Lipid profile parameters in relation to the type of contraceptive

Type of contraceptive	Frequency	Percentage (%)	Laboratory data	Mean (mg/dl)
Combined oral pills	19	47.5	S. cholesterol	171.6
			Serum HDL	36.10
			Serum LDL	91.53
			S. Triglycerides	123.82
Implant	11	27.5	S. cholesterol	165.86
			Serum HDL	36.34
			Serum LDL	85.76
			S. Triglycerides	118.99
Injectable	10	25	S. cholesterol	168.55
			Serum HDL	35.25
			Serum LDL	89.36
			S. Triglycerides	119.6
total	40	100%		

Table (4):-Duration of contraceptive use

Duration	Frequency	Percentage (%)	Laboratory data	Mean (mg/dl)
year	23	57.5	S. cholesterol	166.90
			Serum HDL	35.6
			Serum LDL	88.3
			S. Triglycerides	121.7
2-3 years	17	42.5	S. cholesterol	170.7
			Serum HDL	36.3
			Serum LDL	88.7
			S. Triglycerides	123.47
total	40	100		

Table (5):-Lipid profile in relation to parity among cases.

parity	Frequency	Percentage (%)	Laboratory data	Mean(mg/dl)
<5	29	72.5	S. cholesterol	167.93
			Serum HDL	36.03
			Serum LDL	87.00
			S. Triglycerides	121.17
>5	11	27.5	S. cholesterol	169.78
			Serum HDL	35.67
			Serum LDL	90.65
			S. Triglycerides	123.47
total	40	100		

Table (6):- Mean of Body mass index for case and control.

pair	No	Mean
Body mass index (BMI) case	40	23.51
Body mass index (BMI) control	20	22.8

Table (7):-Mean of atherogenic index of RatioTC/HDL in case and control.

Pair	Mean	
TC/HDL(case)	4.39	Sig=0.000
TC/HDL(control)	2.63	

Table (8):- Mean of atherogenic index of RatioLDL/HDL in case and control.

Pair	Mean	
LDL/HDL(case)	2.30	Sig=0.000
LDL/HDL(control)	1.13	

Discussion

The aim of this research was to study the effect of hormonal contraceptives on lipid profile (Total cholesterol, triglycerides, high density lipoprotein- cholesterol, and low density lipoprotein- cholesterol) in women using contraceptives as test group and women who did not use it as control group.

In table (1) there was slightly increase in the man of s .cholesterol, triglycerides, LDL-c and decrease in HDL-c in the age group (20-39) years which form about (70%) of cases.

Statistical analysis of gathered data reveals that, the mean of serum total cholesterol in case group was (168.49mg/dl) while it was(136.16mg/dl) in control group, the *p* .value 0.000 indicating significant variation between case and control group in serum total cholesterol. There was alsosignificant increase of serum triglycerides in case group with the mean of (120.13mg/dl) while it was

106.89mg/dl in the control group, and the *p* .value 0.000. There was significant increase of serum LDL-c in case group with the mean of (88.78mg/dl) while it was (47.13mg/dl) in control group, with the *p* .value 0.000. There was significant decrease of serum HDL-c in case group is (35.93mg/dl) while it is (95.055mg/dl) in control group, with the *p* .value 0.000, as observed in table (2).

The study demonstrated slight increase in s .cholesterol, triglycerides, and LDL-c of combined oral contraceptive pills comparing with other types of hormonal contraceptive as depicted in table (3).

There was slight increase in s .cholesterol, triglycerides, and LDL-c due to the increased duration of using it as appeared in table (4).

There was slight increase in s .cholesterol, triglycerides, LDL-c and decrease in HDL-c with multiparty>5 which form about (27.5%) of cases as noticed in table (5).

Table (6) reflected slight increase of body mass index in the case group comparing with the control group

Other important observation in this study was increase in the TC/HDL ratio in the case group compared to control, as seen in table (7). There was also increase in LDL/HDL ratio in the casegroup compared to control as highlighted in table (8). The overall results of this study consistent with results of the study carried by George A Asare and others in Ghanaian community in 2014, that revealed a significant increase in total cholesterol among women using hormonal contraceptives with the p .value 0.002. That study also demonstrated significant increase in triglycerides with the p . value 0.026 and significant increase in LDL-c with the p .value 0.004 compared to women who did not use it ⁽¹⁵⁾.

The results of this study were in consistent with some of the results from study in urban city Port Harcourt in Rivers State, Nigeria in 2011, that reported significant change in serum triglycerides with p . value <0.05 and LDL-c in women on oral contraceptives, and significant change with p .value <0.05 in HDL-c and LDL-c in women on injectable contraceptives⁽¹⁶⁾.

The results displayed here were also in agreement with results of study carried by F. Naz and others in Pakistan in 2012, which revealed a significant differences among user of OCs compared to non-users. Total cholesterol (242.92 mg/dl), HDL-c (58.65 mg/dl), LDL-c (115.84 mg/dl), and triglycerides (105.56 mg/dl), which were significantly higher compared to the non-users⁽¹⁷⁾.

The results of this study were also consistent with results conducted in Pakistan in 2016, which illustrated significant elevation in total cholesterol, triglycerides and decrease in HDL-c in females using hormonal contraceptives compared to the non-users.

Conclusion

On the basis of this study, we could conclude that by using hormonal contraceptives, levels of total Cholesterol, triglycerides and low density lipoprotein will increase. While the HDL-c level decreased. The effect was more obvious in the older age group (20-39) years and multiparty >5 and with the used combined oral pills. Therefore reasonable cautious should be exerted by the health professional before prescribing hormonal contraceptives for women at reproductive age.

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