

# LIPID PROFILE IN FEMALES OF REPRODUCTIVE AGE GROUP USING COMBINED ORAL CONTRACEPTIVE PILLS

Uzma Faryal, Shazia Rashid, Bibi Hajra

Department of Biochemistry, Women Medical College, Abbotabad and  
CMH Lahore, Pakistan

## ABSTRACT

**Background:** All available contraception methods have both advantages and disadvantages and it is up to the health provider to make a rational choice. The purpose of this study was to determine the effect of combined oral contraceptive pills on lipid profile in females of reproductive age group.

**Material & Methods:** This comparative cross-sectional study was conducted at Lahore General Hospital, Lahore. A total of 250 married fertile women in their reproductive age were selected. They were divided in two groups: Group 1 (controls) and Group 2 (combined oral contraceptive users at least for one year). Lipid profile was measured using standard kits. Low density lipoprotein-cholesterol was calculated with Fried Wald equation. Results were analyzed by using student's t test.

**Results:** The mean age of the patients in group 1 was  $30.8 \pm 6.5$  and group 2 was  $30.8 \pm 6.2$  years. For subjects in group 1 and group 2 the mean concentration of serum total cholesterol was  $177.9 \pm 40.8$  and  $194.1 \pm 53.0$  mg/dl, respectively. It was significantly increased in group 2 as compared to group 1 ( $p=0.01$ ). The serum triglycerides were  $129.1 \pm 27.7$  and  $153.5 \pm 28.3$  mg/dl, respectively, highly significantly increased in group 2 as compared to group 1 ( $p<0.001$ ). Serum HDL-C was  $53.1 \pm 7.6$  and  $52.8 \pm 8.3$  mg/dl in the two groups respectively. It was insignificantly decreased in group 2 ( $p=0.8$ ). Serum LDL-C was  $130.0 \pm 14.9$  and  $123.1 \pm 14.6$  mg/dl, respectively. This difference was highly significantly ( $p<0.001$ ).

**Conclusion:** Combined oral contraceptive pills adversely affect the lipid profile in females of child bearing age.

**Key Words:** Oral contraceptive, Combined oral contraceptive, Lipid profile.

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## INTRODUCTION

Hormonal contraception means birth control method that acts on the endocrine system. The most widely used methods of hormonal contraception in Pakistan are oral tablets (combined estrogen and progestins) and injectables (progestins only) which are currently provided by family planning centers.<sup>1</sup> Most of the oral contraceptives contain a combination of estrogen and progestin, the doses of which have been progressively decreased over years. In 1960, the first oral contraceptive containing  $150 \mu\text{g}$  mestranol and  $9.5 \text{mg}$  norethynodrel was approved by the US Food and Drug Administration (FDA).<sup>2</sup>

Ethinyl estradiol is the most frequently used estrogen in combined oral contraceptive pills in a dose range from  $20\text{-}35 \mu\text{g}$ . The adverse effects associated with oral pills decrease in direct proportion to the reduction of the estrogenic content.<sup>3</sup> There is increased risk of coronary heart disease associated with elevated concentrations of plasma total cholesterol and low density lipoprotein, decreased plasma concentration of high density lipoprotein and in some circumstances, high levels of total triglycerides.<sup>4</sup>

Before starting oral contraceptives, measurement of lipid profile is recommended in women with dyslipidaemias and alternative non hormonal contraceptive should be sought out if low density lipoprotein-cholesterol is not below  $160 \text{mg/dl}$ .<sup>5</sup> The lowest dose pill containing estrogen and progesterone which can provide good cycle control and produce minimal effect on lipid and carbohydrate metabolism should be prescribed.<sup>6</sup> Estrogens and

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### Corresponding Author:

Dr. Uzma Faryal.  
Assistant Professor  
Department of Biochemistry  
Women Medical College, Abbotabad, Pakistan  
e-mail: faryaluzma@hotmail.com

progestogens in combined oral contraceptive pills can affect lipids.<sup>7</sup> Estrogen increases high density lipoprotein cholesterol, triglycerides and insignificantly alters total cholesterol whereas progestin decreases high density lipoprotein cholesterol levels.<sup>8</sup> These effects are produced by following mechanisms: reductions of total cholesterol and LDL-C suggest estrogen inhibits LDL oxidation in a process not counteracted by progestins, conjugated estrogens augment serum triglycerides.<sup>9</sup>

This study was conducted to determine the effect of combined oral contraceptive pills on lipid profile in females of reproductive age group.

## MATERIAL AND METHODS

This comparative cross sectional study was done at Lahore general hospital, Lahore. A total of 250 married fertile women in their reproductive age were selected. They were divided in two groups: Group 1 (controls-125) and Group 2 (combined oral contraceptive users-125).

Subjects included in group 1 (controls) were married fertile females in reproductive age group (15-49 years) who had not used any kind of hormonal contraceptives and were non pregnant and non lactating. Subjects included in group 2 (combined oral contraceptive users) were married fertile females in reproductive age group (15-49 years) using combined oral pills at least for the last one year and were non pregnant and non lactating. Subjects with hypertension, cardio-vascular disease, diabetes mellitus, liver disease, abnormal nipple discharge and undiagnosed vaginal bleeding were excluded.

Serum total cholesterol, triglycerides, high density lipoprotein-cholesterol were measured using standard kits. Low density lipoprotein-cholesterol was calculated with Fried Wald equation. Student's t test was used to compare the means between the two groups and p value  $>0.05$  was taken as significant.

## RESULTS

The mean age of the patients in group 1 (control) was  $30.8 \pm 6.5$  years and in group 2 (combined oral contraceptives) was  $30.8 \pm 6.2$ . For subjects in group 1 (control) and group 2 (combined oral contraceptives) the mean  $\pm$ SD concentration of serum total cholesterol was  $177.9 \pm 40.8$  mg/dl and  $194.1 \pm 53.0$  mg/dl, respectively. The mean  $\pm$ SD concentration of serum total cholesterol was significantly ( $p=0.01$ ) increased in group 2 (combined oral contraceptive) as compared to group 1 (control).

For subjects in group 1 (control) and group 2 (combined oral contraceptives) the mean  $\pm$ SD concentration of serum triglycerides was  $129.1 \pm 27.7$  mg/dl and  $153.5 \pm 28.3$  mg/dl, respectively. The mean  $\pm$ SD concentration of serum triglycerides was significantly ( $p<0.001$ ) increased in group 2 as compared to group 1.

For subjects in group 1 (control) and group 2 (combined oral contraceptives) the mean  $\pm$ SD concentration of serum HDL-C was  $53.1 \pm 7.6$  mg/dl and  $52.8 \pm 8.3$  mg/dl, respectively. The mean  $\pm$ SD concentration of serum HDL-C was insignificantly ( $p=0.8$ ) decreased in group 2 (combined oral contraceptives) as compared to group 1 (control).

For subjects in group 1 (control) and group 2 (combined oral contraceptives), the serum LDL-C was  $130.0 \pm 14.9$  mg/dl and  $123.1 \pm 14.6$  mg/dl, respectively. It was significantly ( $p<0.001$ ) decreased in group 2 (combined oral contraceptives) as compared to group 1 (control).

## DISCUSSION

The use of hormonal contraceptives by women all over the world is on the increase, especially in recent years when various governments and organizations are campaigning for its use in order to space pregnancies especially in developing countries like Pakistan. The major health risks of oral contraceptives and injectables are cardiovascular diseases particularly coronary artery disease, stroke and venous thromboembolism. There is increased risk of coronary heart disease associated with elevated concentrations of plasma total cholesterol

**Table 1: Comparison of mean total cholesterol, triglycerides, HDL-C and LDL-C between group 1 and group 2.**

Variables	Group-1 (n=125) (mean $\pm$ SD)	Group-2 (n=125) (mean $\pm$ SD)	P-value
Total cholesterol (mg/dl)	177.9 $\pm$ 40.8	194.1 $\pm$ 53.0	0.01
Total triglyceride (mg/dl)	129.1 $\pm$ 27.7	153.5 $\pm$ 28.3	<0.001
HDL-C (mg/dl)	53.1 $\pm$ 7.6	52.8 $\pm$ 8.3	0.8
LDL-C (mg/dl)	130.0 $\pm$ 14.9	123.1 $\pm$ 14.6	<0.001

and low density lipoprotein, decreased plasma concentration of high density lipoprotein and, in some circumstances; high levels of total triglycerides.<sup>10</sup> Present study included two groups: controls and combined oral contraceptives users.

In our study, there was a significant increase in serum total cholesterol and triglycerides in subjects using combined oral contraceptives as compared to control. Estrogen increases liver lipogenesis which results in elevated levels of triglycerides, VLDL and HDL-C levels and also causes an increase in the synthesis of hepatic LDL-C receptors and a resulting increase in the removal of serum LDL-C and hence reduction in its levels. Many authors have observed increased levels of triglycerides.<sup>11</sup> Godsland et al also found 13 to 75% increase in triglyceride levels in users of low doses combined oral contraceptives in their study with oral pills use.<sup>12</sup> Our results were in accordance to Hinton and his colleagues work, their study revealed that oral estrogens and progestins in hormonal contraceptives have been shown to increase total cholesterol and triglycerides. A statistically significant elevation in total cholesterol and triglycerides level was seen in their study.<sup>13</sup> HDL-C was insignificantly decreased in combined oral contraceptive users as compared to controls in our study which was in accordance to study conducted by a group of workers.<sup>14</sup> Whereas LDL-C was significantly decreased in combined oral contraceptive users as compared to nonusers in the present study. This was a finding different from that observed by some workers in a study.<sup>12</sup> An observation in a study was that low estrogen/progesterone dosages of combined contraceptives reduces the adverse effects of plasmatic lipids and lipoproteins.<sup>15</sup>

The combined oral contraceptive induced increase in triglycerides is due to increased synthesis rather than decreased clearance.<sup>16</sup> Some workers revealed in their study that the users of combined oral contraceptives experienced significantly greater increases in levels of triglycerides, total cholesterol, very-low-density lipoprotein cholesterol, and high-density lipoprotein cholesterol than did non hormonal contraceptive users ( $P < 0.001$ ).<sup>17</sup>

In some studies increase in LDL-C and VLDL-C was seen with duration of intake of oral pills.<sup>18</sup> In another study, a statistically significant elevation in total cholesterol, HDL-C, LDL-C and triglycerides level was seen in combined oral contraceptive users.<sup>19</sup> However this observation and observation in the present study is different from that reported by other investigators.<sup>20</sup> HDL-C is involved in the reverse cholesterol transport from peripheral cells to the liver, prevents oxidation of LDL-C because of paroxonase in HDL-C. Paroxonase is synthesized in the liver and is HDL associated enzyme that inhibits oxidation of LDL-C.<sup>21</sup> On the other hand, Syed

et al. reported no significant variations in serum triglyceride, LDL cholesterol and VLDL cholesterol in a group of women on oral contraceptive pills.<sup>22</sup>

## CONCLUSION

Combined oral contraceptive pills adversely affects the lipid profile in females of child bearing age. It is suggested that lipid profile should be estimated before and during the course of combined oral contraceptives.

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